McQuay International

Installation, Operation, and Maintenance Manual

IOM 1210-1

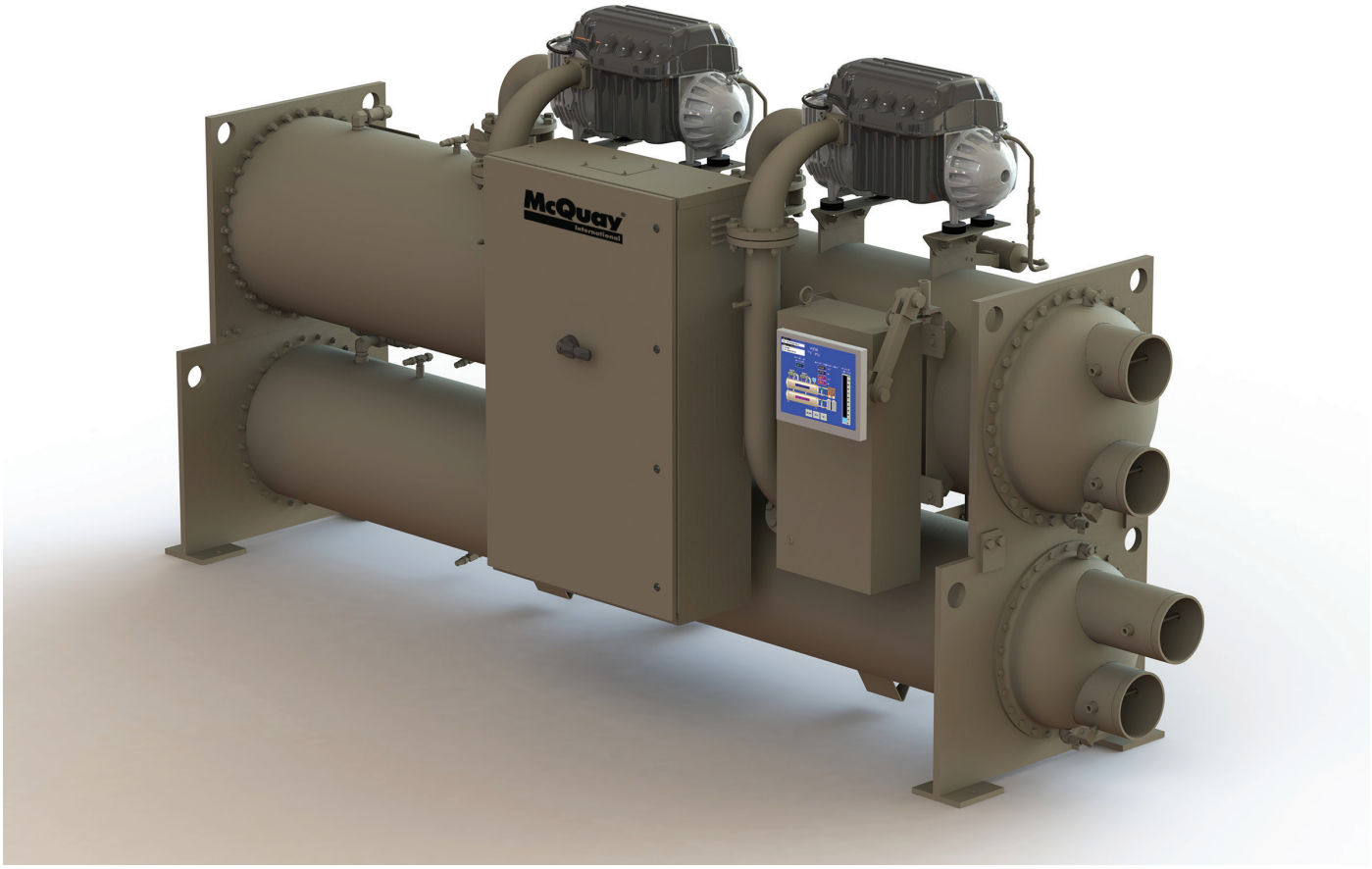
Group: **Chiller**

Part Number: **IOM1210-1**

Date: **August 2014**

Magnitude®
Magnetic Bearing Centrifugal Chillers

Model WMC, C Vintage
125 to 400 Tons (440 to 1400 kW)
HFC-134a Refrigerant
50/60 Hz



Introduction. 3
General Description 4
The Control System 5
Installation. 6
Receiving and Handling 6
Nameplates 6
Location. 6
Clearance 6
Unit Dimensions and Shipping Weight 7
Mounting 8
Water Piping 8
Vessel Drains at Startup 8
Condenser Water Temperature Control 9
Relief Valves 10
Field Insulation 11
Field Power Wiring 11
Communication Setup for Multiple Chillers 18
Long Term Storage 18
Pre-Start Checklist 19
Operation. 20
Operator Responsibilities 20
Operator Schools 20
Sequence of Unit Operation 20
Unit Enabling/Disabling 20
Operator Interface Touch Screen (OITS) 21
The Controller 48
Building Automation Systems (BAS) 58
Use with On-Site Generators 58
Maintenance 59
Service Programs 59
Chiller Maintenance 59
Seasonal Shutdown 59
Seasonal Startup 59
Maintenance Schedule 60
Appendix 61
Definitions 61
Temperature / Pressure Chart 64

Manufactured in an ISO 9001 & ISO 14001 certified facility

©2014 Daikin Applied. Illustrations and data cover the Daikin Applied product at the time of publication and we reserve the right to make changes in design and construction at any time without notice.

This manual provides installation, operation, and maintenance information for McQuay WMC Magnitude® centrifugal chillers with the MicroTech® II controller.

⚠ WARNING

Electric shock hazard. Improper handling of this equipment can cause personal injury or equipment damage. This equipment must be properly grounded. Connections to and service of the MicroTech® II control panel must be performed only by personnel that are knowledgeable in the operation of the equipment being controlled.

⚠ CAUTION

Static sensitive components. A static discharge while handling electronic circuit boards can cause damage to the components. Discharge any static electrical charge by touching the bare metal inside the control panel before performing any service work. Never unplug any cables, circuit board terminal blocks, or power plugs while power is applied to the panel.

NOTICE

This equipment generates, uses, and can radiate radio frequency energy. If not installed and used in accordance with this instruction manual, it may cause interference with radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the owner will be required to correct the interference at the owner's own expense.

Daikin Applied disclaims any liability resulting from any interference or for the correction thereof.

HAZARD IDENTIFICATION INFORMATION

⚠ DANGER

Dangers indicate a hazardous situation, which will result in death or serious injury if not avoided.

⚠ WARNING

Warnings indicate potentially hazardous situations, which can result in property damage, severe personal injury, or death if not avoided.

⚠ CAUTION

Cautions indicate potentially hazardous situations, which can result in personal injury or equipment damage if not avoided.

General Description

McQuay Magnitude® Centrifugal Chillers are complete, self-contained, automatically controlled, fluid-chilling units featuring oil-free, magnetic bearing compressors. All Magnitude® chillers are equipped with a single evaporator and a single condenser along with either one or two compressors depending on the model.

Magnitude® chillers are designed for indoor, non-freezing installation only. The chillers use refrigerant HFC-134a that operates at a positive pressure over the entire operation range, so no purge system is required.

Only normal field connections such as water piping, relief valve piping, electric power, and control interlocks are required, thereby simplifying installation and increasing reliability. Necessary equipment protection and operating controls are included.

All McQuay International centrifugal chillers must be commissioned by a factory-trained McQuay International service technician. Failure to follow this startup procedure can affect the equipment warranty.

The standard limited warranty on this equipment covers parts that prove defective in material or workmanship. Specific details of this warranty can be found in the warranty statement furnished with the equipment.

NOMENCLATURE

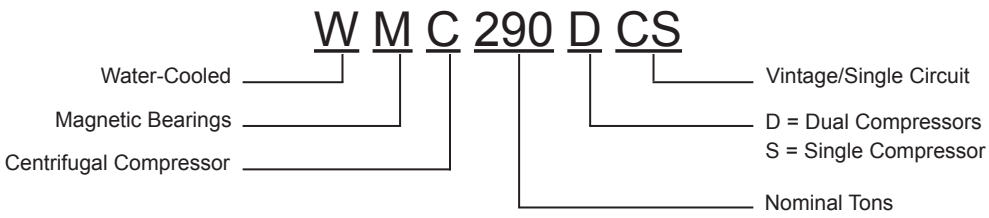
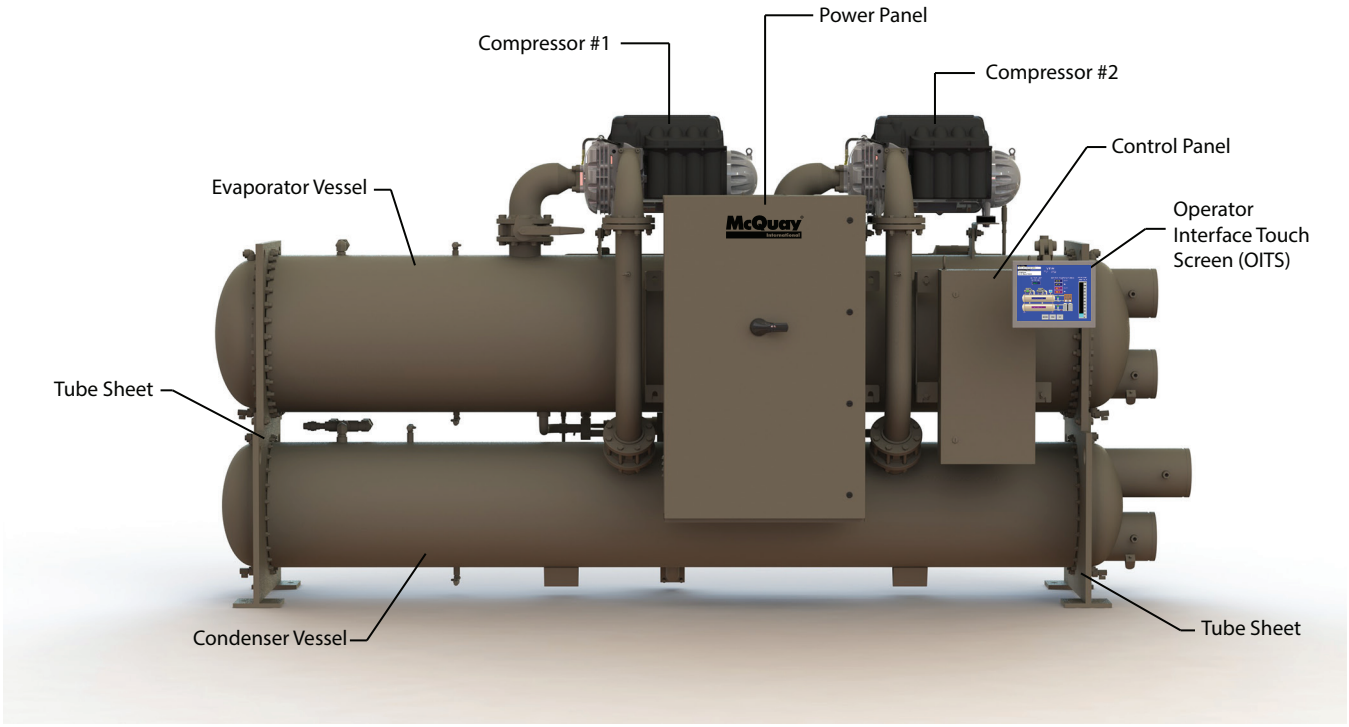


Figure 1: WMC-C Major Component Locations



NOTE: Unit shown with right-hand water connections. Water connection orientation is based on facing the unit power panel.

The Control System

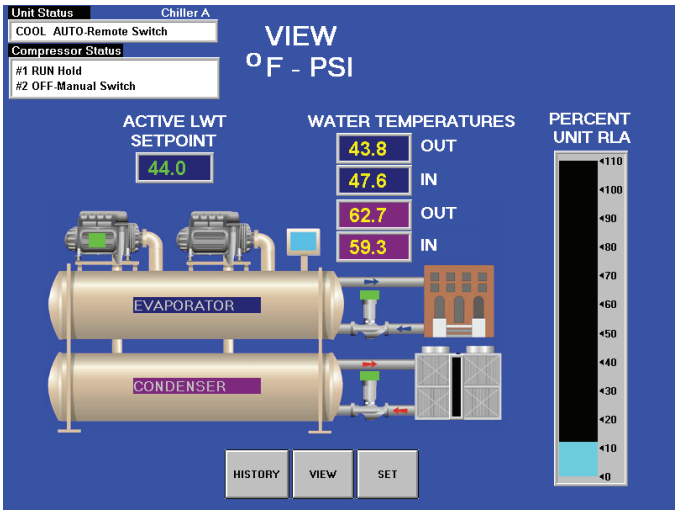
The centrifugal MicroTech® II control system consists of an operator interface touch screen (OITS), a microprocessor-based unit controller, and compressor on-board controllers, providing monitoring and control functions required for the efficient operation of the chiller.

Operator Interface Touch Screen

The operator interface touch screen (OITS), see Figure 2 for an example of a screen display, is the primary device for viewing unit operation information and entering commands and entries into the control system. Select information from the OITS panel can be downloaded via a USB port located in the unit control panel.

A single OITS is used per unit. The OITS panel, see Figure 1, is mounted on a moveable arm to allow placement in a convenient position for the operator. The OITS PC is located in the Control Panel, as shown in Figure 3. For more information on the OITS, see the "Operator Interface Touch Screen (OITS)" section starting on page 21.

Figure 2: Operator Interface Touch Screen

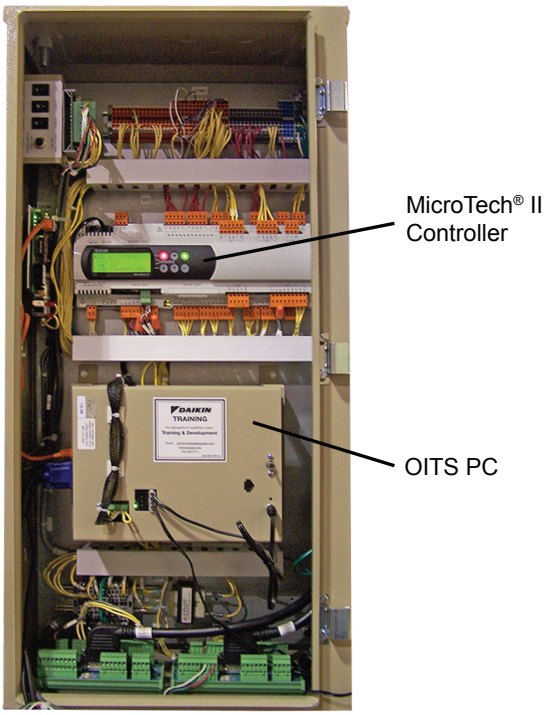


Unit Controller

The purpose of the MicroTech® II unit controller is to acquire and process data relating to chiller operation, issue instructions to various components of the chiller, and maintain controlled operation of the chiller. As a part of operating the chiller successfully, the unit controller offers necessary condenser water control. See "Condenser Water Temperature Control" on page 9 for more information.

The controller is located in the control panel, as shown in Figure 3. It has a 4x20 LCD display and keys for accessing data and changing setpoints. The controller sends information to the operator interface touch screen (OITS) for graphic display. If the OITS should become inoperable, the controller LCD can display most of the same information as the OITS and can be used to operate the chiller independently of the OITS. See "The Controller" section on page 48 for information.

Figure 3: Control Panel

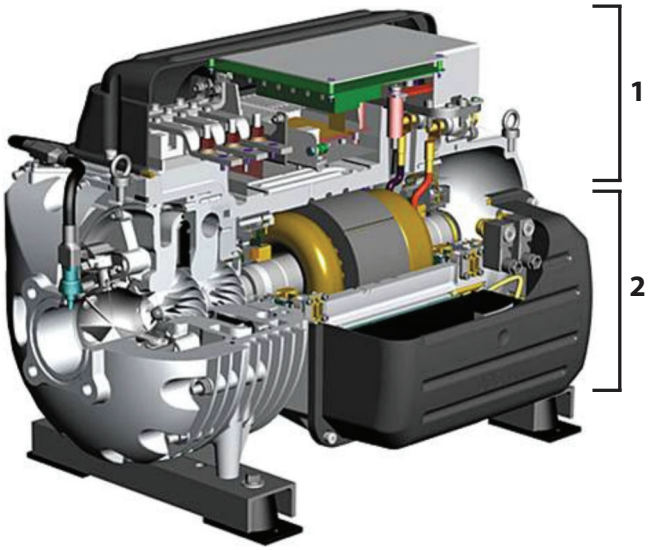


Compressor On-Board Controllers

Each compressor is equipped with microprocessor controllers and sensors that provide control and data acquisition. The data is transmitted to other controllers and the OITS via the multi-unit communication network. The on-board controllers control compressor functionality and the motor/bearing system.

Figure 4: Compressor Cutaway

1. Power Electronics
2. Control Electronics



Receiving and Handling

The unit should be inspected immediately after receipt for possible damage. All McQuay International centrifugal water chillers are shipped FOB factory and all claims for handling and shipping damage are the responsibility of the consignee.

On units with factory-installed insulation, the insulation is removed from the vessel lifting hole (also used for transportation tie-downs) locations and is shipped loose. It should be secured in place after the unit is finally placed. Neoprene vibration isolation pads are shipped loose in the power panel. If the unit is equipped with a shipping skid, leave the skid in place until the unit is in its final position. This will aid in handling the equipment.

⚠ CAUTION

Extreme care must be used when rigging the unit to prevent damage to the control panels and refrigerant piping. See the certified dimension drawings included in the job submittal for the weights and center of gravity of the unit. If the drawings are not available, consult the local McQuay International sales office for assistance.

The unit can be lifted by fastening the rigging hooks to the four corners of the unit where the rigging eyes are located. A spreader bar must be used between the rigging lines to prevent damage to the control panels, piping, and electrical panels. The spreader-bar length should be equal to, or no more than 1-foot shorter than, the distance between the lifting holes located at opposite ends of the chiller. The unit will require a single spreader-bar of this length capable of supporting 1.5 times the shipping weight of the unit. Separately, all cables and hooks by themselves must also be capable of supporting 1.5 times the shipping weight of the unit.

If a knockdown option was ordered on the unit, reference the Knockdown Installation Manual for more information.

Nameplates

There are several identification nameplates on the chiller:

- The unit nameplate is located on the Unit Control Panel. Both the Model No. and Serial No. are unique to the unit and will identify it. These numbers should be used to identify the unit for service, parts, or warranty questions. This plate also has the unit refrigerant charge and electrical ratings.
- Vessel nameplates are located on the evaporator and condenser. They have a National Board Number (NB) and a serial number, either of which identify the vessel (but not the entire unit).

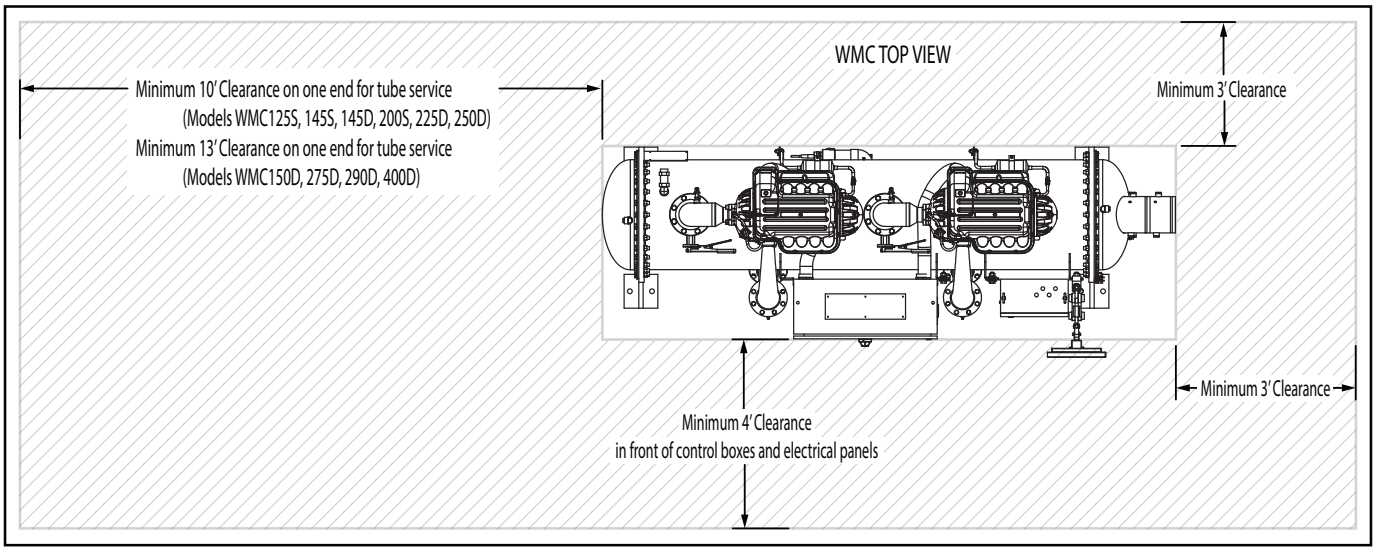
Location

WMC chillers are intended only for installation in an indoor or weather protected area consistent with the NEMA 1 rating on the chiller, controls, and electrical panels. Equipment room temperature for operating and standby conditions is 40°F to 104°F (4.4°C to 40°C).

Clearance

The unit must be placed in an area that allows for adequate clearance around the unit. See Figure 5 for clearance requirements around the sides of the chiller. Doors and removable wall sections can be utilized to meet these clearance requirements. There must be a minimum 3-feet clearance above the top of the chiller. The U.S. National Electric Code (NEC) or local codes can require more clearance in and around electrical components and must be checked for compliance.

Figure 5: Minimum Clearances Based on Standard Waterboxes


WMC TOP VIEW
Minimum 10′ Clearance on one end for tube service
(Models WMC125S, 145S, 145D, 200S, 225D, 250D)
Minimum 13′ Clearance on one end for tube service
(Models WMC150D, 275D, 290D, 400D)
Minimum 3′ Clearance
Minimum 3′ Clearance
Minimum 4′ Clearance
in front of control boxes and electrical panels

NOTE: Hinged type waterboxes may require more clearance. Consult a McQuay International sales representative for details.

Unit Dimensions and Shipping Weight

Figure 6: WMC125-200S (2-pass, right-hand configuration, with grooved connections)

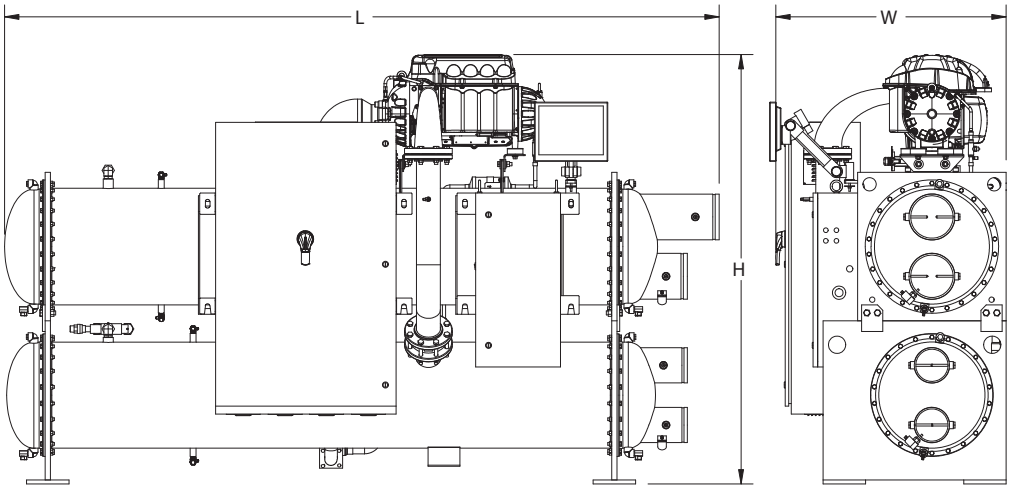


Figure 7: WMC145-400D (2-pass, right-hand configuration, with grooved connections)

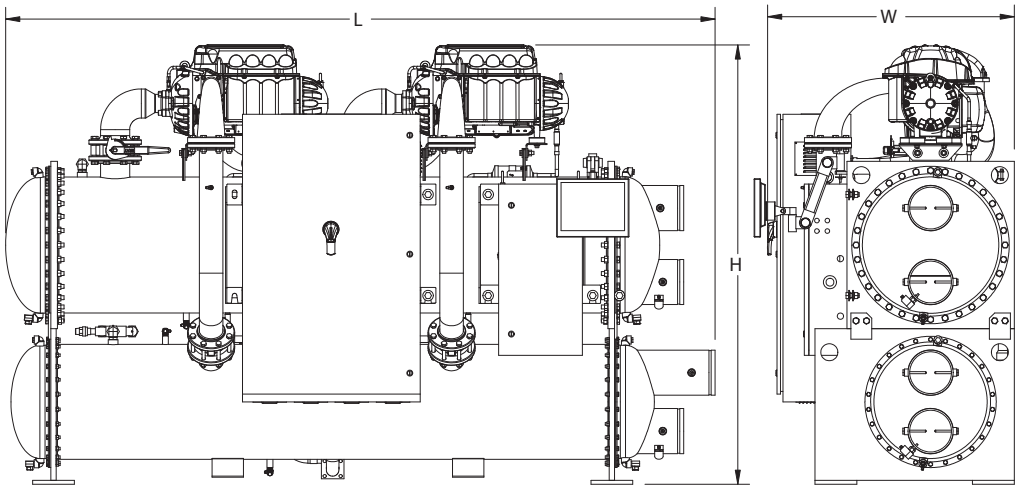


Table 1: WMC125-400 Dimensions and Shipping Weights

Model	Heat Exchanger	Length in (mm)	Width * in (mm)	Height in (mm)	Shipping Weight ** lb (kg)
WMC125S	**E2209 / C2009**	134.3 (3411)	43.5 (1105)	81.0 (2057)	5086 (2307)
WMC145S	**E2209 / C2009**	134.3 (3411)	43.5 (1105)	81.0 (2057)	5586 (2534)
WMC145D	**E2209 / C2009**	134.3 (3411)	43.5 (1105)	80.8 (2052)	6760 (3066)
WMC150D	**E2212 / C2012**	169.2 (4298)	43.5 (1105)	80.8 (2052)	7709 (3497)
WMC200S	**E2609 / C2209**	134.2 (3409)	47.2 (1199)	82.9 (2106)	6705 (3041)
WMC225D	**E2609 / C2209**	134.2 (3409)	47.2 (1199)	83.8 (2129)	7250 (3289)
WMC250D	**E2609 / C2209**	134.2 (3409)	47.2 (1199)	83.8 (2129)	7850 (3561)
WMC275D	**E2612 / C2212**	169.1 (4295)	47.2 (1199)	83.9 (2131)	8221 (3729)
WMC290D	**E2612 / C2212**	169.1 (4295)	47.2 (1199)	83.9 (2131)	9321 (4228)
WMC400D	**E3012 / C2612**	168.5 (4280)	55.2 (1402)	94.3 (2395)	11574 (5250)

* Width is based on unit without optional harmonic filters.
** Shipping weight is based on unit with standard tube configuration.

Mounting

The unit must be mounted on a concrete or steel base. Make sure that the floor or structural support is adequate to support the full operating weight of the complete unit.

The neoprene vibration pads (shipped loose in the power panel) should be placed under the corners of the unit (unless the job specifications state otherwise). They must be installed so that they are flush with the edges of the unit feet.

It is not necessary to bolt the unit to the mounting slab or framework. Should this be required by local codes, 1-1/8 inch (28.5 mm) mounting holes are provided in the unit supports at the four corners.

When mounted, the base pad of the unit must be level to within ± 1/2 inch across the length and width of the unit.

Water Piping

All vessels come standard with groove-type nozzles (also suitable for welding) or optional flange connections. The installing contractor must provide matching mechanical connections of the size and type required. Grooved connections are AWWA C-606. Be sure that water inlet and outlet connections match certified drawings and nozzle markings.

NOTE: If victaulic brand AGS® (Advanced Groove System) type grooves are used on the field piping, the contractor must supply the appropriate transition connectors.

⚠ CAUTION

If welding is to be performed on the mechanical or flange connections:

1. Remove the solid-state temperature sensor, thermostat bulbs, and nozzle mounted flow switches from the wells to prevent damage to those components.
2. Properly ground the unit or severe damage to the MicroTech® II unit controller can occur.

NOTE: ASME certification will be revoked if welding is performed on a vessel shell or tube sheet.

The water heads can be interchanged (end for end) so that the water connections can be made at either end of the unit. If this is done, use new head gaskets and relocate the control sensors.

Field installed water piping to the chiller must include:

- air vents at the high points.
- a cleanable 20-mesh water strainer in water inlet lines.
- a flow proving device for both the evaporator and condenser to prevent freeze up. Flow switches, thermal dispersion switches, or Delta-P switches can be used. Note that flow switches are factory installed. Additional flow switches can be used only if they are connected in series with the ones already provided. Connect additional flow switches in series between CF1 and CF2, shown in "Figure 12: Wiring Index" starting on page 12.
- sufficient shutoff valves to allow vessel isolation. The chiller must be capable of draining the water from the evaporator or condenser without draining the complete system.

It is recommended that field installed water piping to the chiller include:

- thermometers at the inlet and outlet connections of both vessels.
- water pressure gauge connection taps and gauges at the inlet and outlet connections of both vessels for measuring water pressure drop.

⚠ CAUTION

When common piping is used for both building heating and cooling modes, care must be taken to provide that water flowing through the evaporator cannot exceed 110°F. Water this hot can damage controls or cause the relief valve to discharge refrigerant.

Piping must be supported to eliminate weight and strain on the fittings and connections. Chilled water piping must be adequately insulated.

Vessel Drains at Startup

The unit is drained of water at the factory and shipped with open drain valves in each head of the evaporator and condenser. Be sure to close the valves prior to filling the vessel with fluid.

Condenser Water Temperature Control

Condenser water control is an important consideration in chiller plant design since condenser water temperature will directly impact chiller operation and efficiency. When the ambient wet bulb temperature is lower than peak design, the entering condenser water temperature from the cooling tower can be allowed to fall, improving chiller performance. However, operational issues may occur when the condenser water temperatures are either too high or too low. The WMC chiller provides several options to assist the chiller plant designer in providing the optimum control of condenser water temperature.

Cooling Tower Control

Control of the cooling tower is required to maintain stability and avoid operational issues. This can be achieved through a BAS or by using the MicroTech® II controller. For systems utilizing a common condenser water loop for multiple purposes, the BAS contractor must provide the control but use of the MicroTech® II output signal is still recommended.

The preferred cooling tower control utilizes a variable speed fan. MicroTech® II will provide a control signal to determine the proper fan speed. It can also control up to four stages of fan cycling. Note that fan cycling can cause cooling tower water temperature to fluctuate as fans stage on/off, potentially adding instability to the system.

Special consideration must be given to starting the chiller when cold condenser water is present, such as with inverted starts or changeover from free (tower) cooling to mechanical cooling. It is required that some method be used to control the condenser water to maintain proper head pressure as indicated by the MicroTech® II controller.

Acceptable methods include the following **(Each of these options can be controlled by the MicroTech® II or through a BAS utilizing the MicroTech® II output signals.)**:

1. Three-Way Bypass Valve Operation

   A traditional method for building condenser pressure at startup with colder condenser water is with the use of a three-way bypass valve. The device blends warmer water leaving the condenser with cooler water from the cooling tower at the condenser inlet. The bypass valve position will change until full flow from the tower to the condenser is obtained. The MicroTech® II provides only the valve position control signal. Main power to drive the valve's actuator must be provided by the installer. The three-way valve should be located close to the chiller within the equipment room to minimize the volume of water.

2. Two-Way Valve Operation

   Another condenser control method is to use a modulating two-way control valve located on the outlet connection of the condenser. The valve will be nearly closed at startup to restrict water flow, which keeps generated heat in the condenser until an acceptable minimum condenser pressure is reached. As heat builds, the valve will open slowly until a full flow condition from the cooling tower is established. A separate power source is required to provide power to the valve actuator.

3. VFD Operating with a Condenser Water Pump

   A third method of condenser control for startup is utilizing a variable frequency drive with the condenser water pump. The speed will change as directed by the MicroTech® II output signal until design flow is reached. Speed adjustments may be required during the initial chiller startup as determined by the service technician.

NOTE: Not using the MicroTech® II logic to control valves and variable frequency drives may result in system instability, capacity reduction, and issues starting the chiller with cold condenser water temperature.

Condenser Pump Sequencing

It is recommended to utilize the logic built into the MicroTech® II controller to start the condenser pump and maintain condenser head pressure control. MicroTech® II has the capability to operate a primary pump and a secondary standby pump. The condenser water flow should be stopped when the chiller shuts off. This will conserve energy and prevent refrigerant from migrating to the condenser.

Lenient Flow Operation

For chiller startup, the condenser control systems can reduce the flow to very low rates, which can make operation of a flow sensing device questionable. The MicroTech® II controller has a "lenient flow" feature that acts as an override of the flow sensor while protecting the chiller by monitoring a condenser pressure setting that is below the high pressure cutout.

Water Side Economizer Cycle Operation

Water side economizers are commonly used for ASHRAE 90.1 compliance and energy savings. This system utilizes a heat exchanger external to the chiller when cold cooling tower water is available to provide cooling. The most common system has a heat exchanger used in conjunction with the chiller's evaporator.

The BAS contractor will need to provide controls for the heat exchanger including isolation valves and temperature control. The BAS contractor will also need to control the isolation valves for the chiller. It is important to use slow-acting type valves to prevent rapid changes in system flows. Changeover from economizer cooling to mechanical cooling requires one of the methods previously mentioned to maintain suitable condenser head pressure.

Contact your local McQuay International representative for more information on this application.

Relief Valves

As a safety precaution and to meet code requirements, each chiller is equipped with pressure relief valves located on the condenser and evaporator for the purpose of relieving excessive refrigerant pressure (caused by equipment malfunction, fire, etc.) to the atmosphere.

- Condensers have two 200 psi, 1.0-inch female NPT relief valves as a set with a three-way valve separating the two valves. (See Figure 8.) One valve remains active at all times and the second valve acts as a standby.
- Evaporators have a single 200 psi valve. Each valve has a 1.0-inch female NPT connection.
- When purchased with a suction isolation valve, each suction line has a single 200 psi relief valve rated at 6.9 lb/min air with a 3/8-inch flare connection.
- Vessel valve capacity is 75 lb/min air.

⚠ CAUTION

Units are shipped with refrigerant valves closed to isolate the refrigerant in the unit condenser. Valves must remain closed until startup by the factory service technician.

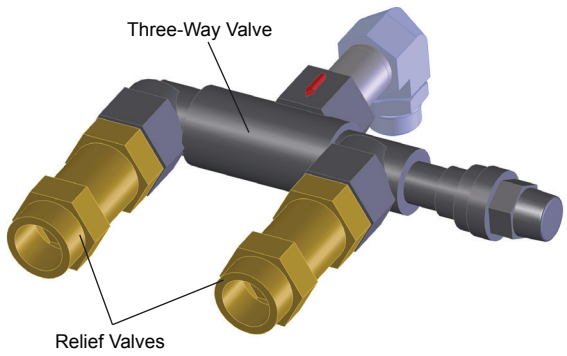
Most codes require that relief valves be vented to the outside of a building. Relief piping connections to the relief valves must have flexible connectors.

Remove plastic shipping plugs (if installed) from the inside of the valves prior to making pipe connections. Whenever vent piping is installed, the lines must be in accordance with local code requirements; where local codes do not apply, the latest issue of ANSI/ASHRAE Standard 15 code recommendations must be followed.

Condenser Relief Valves

As stated previously and as shown in Figure 8, condensers have two 200 psi, 1.0-inch female NPT relief valves separated by a three-way valve.

Figure 8: Condenser Three-Way Relief Valve



In order to ensure proper installation, it is important to know how the three-way relief valve functions. When the stem of the three-way valve is pushed into the valve completely, the valve is in “Front Seated Position” and all refrigerant will flow through the back outlet port, as shown in Figure 9. When the stem of the three-way valve is pulled back completely, the valve is in “Back Seated Position” and all refrigerant will flow through the front outlet port as shown in Figure 10.

Figure 9: Three-Way Valve, Front Seated Position

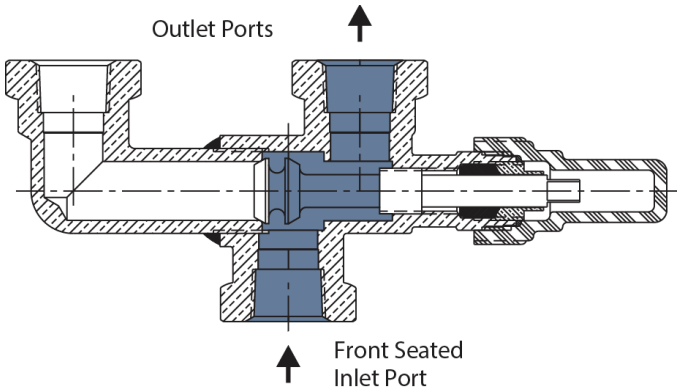
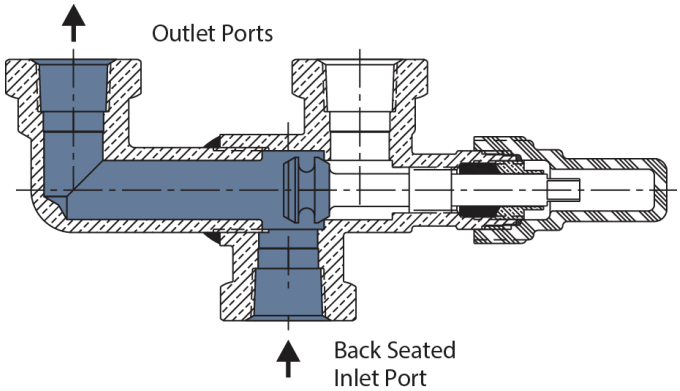


Figure 10: Three-Way Valve, Back Seated Position

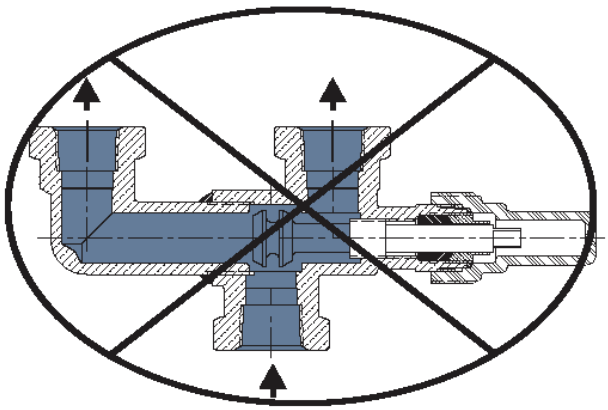


When the valve stem is not pushed forward or pulled back completely, the valve is in “Mid Position,” as shown in Figure 11.

⚠ CAUTION

Do not operate the system with the three-way valve stem in the Mid Position.

Figure 11: Three-Way Valve, Mid Position



Field Insulation

If the optional factory-installation of thermal insulation is not ordered, insulation should be field installed to reduce heat loss and prevent condensation from forming. Insulation should cover:

- the evaporator barrel, tube sheet, and waterboxes.
- the suction line from the top of the evaporator to the compressor inlet flange.
- the compressor support brackets welded to the evaporator.
- the liquid line from the expansion valve to the evaporator inlet, including the expansion valve.
- the part load balancing valve to the evaporator.

Approximate total square footage of insulation surface required for individual packaged chillers is tabulated by evaporator code and can be found in Table 2.

Table 2: Insulation Area Required for WMC Models

WMC Model	Evaporator Code	Insulation Area sq. ft. (m^2)
125S	E2209	78 (7.2)
145S	E2209	78 (7.2)
145D	E2209	78 (7.2)
150D	E2212	104 (9.7)
200S	E2609	92 (8.5)
225D	E2609	92 (8.5)
250D	E2609	92 (8.5)
275D	E2612	122 (11.3)
290D	E2612	122 (11.3)
400D	E3012	141 (13.1)

Field Power Wiring

The standard power wiring connection to Magnitude® chillers is single point to a common disconnect switch, which is then factory-wired to individual disconnect switches for each circuit. Refer to the unit nameplate and the Daikin Tools selection report for the correct electrical ratings.

⚠ DANGER

Qualified and licensed electricians must perform wiring. An electrical shock hazard exists that can cause severe injury or death.

The field power wiring required varies depending on unit model. See “Figure 12: Wiring Index” on page 12, “Figure 13: Controller Box Wiring” on page 14, and “Figure 14: Power Box Single and Multi Point Wiring” on page 16 for wiring information. These wiring diagrams are also provided with the chiller.

Factory-mounted and wired line reactors are standard, but not included when the optional combo harmonic filters are included.

NOTE: Wiring, fuse, and wire size must be in accordance with the National Electric Code (NEC). The voltage to these units must be within ±10% of nameplate voltage (415V units must have voltage within -13% and +6% of nameplate voltage) and the voltage unbalance between phases must not exceed 2%. Since a 2% voltage unbalance will cause a current unbalance of 6 to 10 times the voltage unbalance per the NEMA MG-1 1998 Standard, it is most important that the unbalance between phases be kept at a minimum.

⚠ CAUTION

Do not use power factor correction capacitors with WMC chillers. Doing so can cause harmful electrical resonance in the system. Correction capacitors are not necessary since VFDs inherently maintain high power factors.

Chiller Control Power

For proper operation on standby power, the chiller control power must remain as factory-wired from a unit-mounted transformer. Do not supply chiller control power from an external power source because the chiller may not sense a loss of power and may fail to perform a normal shutdown sequence.

PART NUMBER	REV.	PART DESCRIPTION
910146926	0B	WMC*C WIRING SCHEMATIC

THE CONTENTS OF THIS MATERIAL ARE CONFIDENTIAL AND PROPRIETARY TO DAIKIN APPLIED. ANY UNAUTHORIZED USE, REPRODUCTION, DISCLOSURE OR TRANSFER IS STRICTLY PROHIBITED. IF FURNISHED WITH A PROPOSAL, RECIPIENT MAY USE THIS MATERIAL SOLELY TO EVALUATE SUCH PROPOSAL. IF FURNISHED TO AN EXISTING OR POTENTIAL VENDOR, THIS MATERIAL MAY BE USED SOLELY IN PREPARATIONOF PROPOSAL OR PERFORMANCE OF WORK FOR DAIKIN APPLIED.

DRAWING INDEX

SHEET	DESCRIPTION:	SHEET	DESCRIPTION:
1 OF 4	INDEX, LEGEND, FIELD CONNECTIONS AND SYMBOLS	3 OF 4	POWER BOX SINGLE POINT WIRING DIAGRAM
2 OF 4	CONTROLLER BOX WIRING DIAGRAM	4 OF 4	POWER BOX MULTI POINT WIRING DIAGRAM

SCHEMATIC LEGEND AND FIELD CONNECTIONS

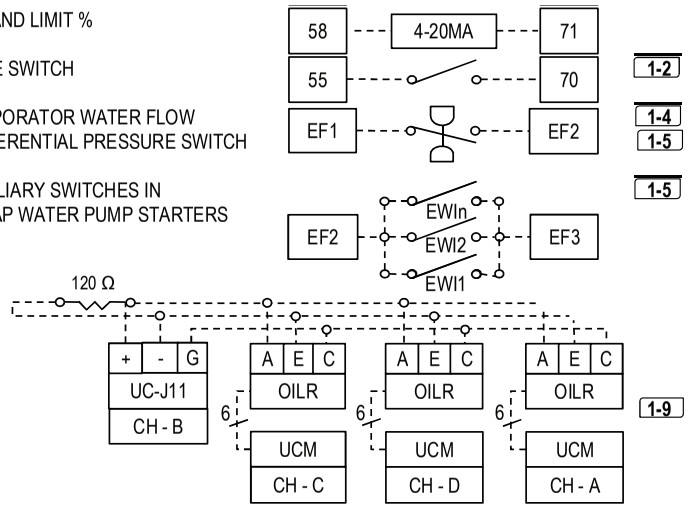
A	ALARM	**E**	EARTH	**I/O CM**	INPUT / OUTPUT COMPRESSOR MODULE	**SPPB**	SINGLE POINT POWER BLOCK
B	ANALOG INPUT CONNECTIONS	**EFS**	EVAPORATOR FLOW SWITCH	**K1T**	TIME DELAY RELAY	**SW1**	UNIT START/STOP SWITCH
C	COMPRESSOR	**EMI**	ELECTRO-MAGNETIC INTERF FILTER	**K1V**	SURGE RELAY	**SW2**	COMP MANUAL OFF SWITCH
CB	CIRCUIT BREAKER	**EP**	EVAPORATOR PUMP CYCLING RELAY	**K1R**	HARMONIC FILTER 1 RELAY	**SW3**	REMOTE START/STOP SWITCH
CF	CONDENSER FLOW SWITCH	**EWI**	EVAPORATOR WATER INTERLOCKS	**K2R**	HARMONIC FILTER 2 RELAY	**SW4**	MODE SWITCH
CH	CHILLER	**EXV**	ELECTRONIC EXPANSION VALVE	**LR**	LINE REACTOR	**SW5**	EMERGENCY STOP SWITCH
CNT	CONTACTOR	**EXVB**	ELECTRONIC EXPANSION VALVE BOARD	**LBV**	LOAD BALANCE VALVE	**T**	CONTROL TRANSFORMER
CP	CONDENSER PUMP CYCLING RELAY	**F**	FUSE	**M1T**	HIGH AMBIENT FAN	**TB1**	TERMINAL BLOCK
CPB	CAPACITOR BANK	**FB**	FUSE BLOCK	**OILR**	OPTICALLY ISOLATED LINE REPEATER	**TR**	TUNNING REACTOR
CT	COOLING TOWER RELAY STAGE	**GFP**	GROUND FAULT PROTECTOR	**PE**	PROTECTIVE EARTH	**TRTS**	TRAP REACTOR THERMAL SWITCH
CTB1	TERMINAL BLOCK	**HF**	HARMONIC FILTER	**RB**	RESISTOR BANK	**UC**	UNIT CONTROLLER
CWI	CONDENSER WATER INTERLOCKS	**ID**	DIGITIAL INPUT CONNECTIONS	**R1V**	SURGE ABSORBER	**UCM**	UNIT COMMUNICATION MODULE
DS	DISCONNECT SWITCH	**IR**	ISOLATION RELAY	**S1T**	HIGH AMBIENT FAN THERMOSTAT	**UTB1**	TERMINAL BLOCK

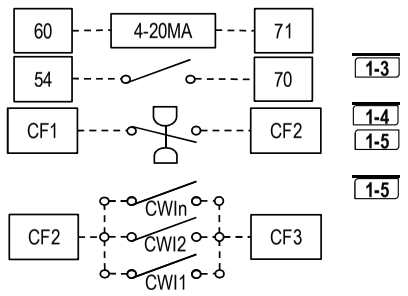
SCHEMATIC SYMBOLS

POWER SOURCE	CABLE-TWISTED, SHIELDED & JACKETED PAIR	SWITCH, THERMAL TEMPERATURE N.O.	SURGE ABSORBER
POWER BOX TERMINAL	FUSE	SWITCH, THERMAL TEMPERATURE N.C.	RELAY COIL
POWER BOX TERMINAL. FIELD CONNECTION	RESISTOR	SWITCH, PRESSURE DIFFERNETIAL	WIRE QUANTITY
UNIT BOX TERMINAL.	THERMISTOR	SWITCH, PRESSURE N.O.	TRANSFORMER
UNIT BOX TERMINAL. FIELD CONNECTION	GROUND, EARTH	SWITCH, PRESSURE N.C.	NOTE [SHEET - SEQUENCE]
FACTORY WIRING	GROUND, PROTECTED EARTH	SWITCH, N.O.	ANALOG, I/O
FIELD WIRING	GROUND, SHIELDED EARTH	SWITCH, N.C.	TERMINAL BLOCK
			OPTION BOX

COMPONENT DESCRIPTION:		TERMINAL BLOCK CONNECTION:	NOTE:
MPC	MAIN MULTI POINT CONNECTION	CB1 — CB2	1-1
GND	GROUND / EARTH	E — E	
RLA%	CHILLER RLA %	57 — 0-10VDC — 71	1-2
CTBV	COOLING TOWER BYPASS VALVE	52 — 0-10VDC — 71	
CTVFD	COOLING TOWER VFD	53 — 0-10VDC — 71	
CTTR	COOLING TOWER TEMP RESET	56 — 0-10VDC — 71	
CT1	COOLING TOWER RELAY STAGE 1	77 — 86	1-8, 1-7
CT2	COOLING TOWER RELAY STAGE 2	78 — 86	
CT3	COOLING TOWER RELAY STAGE 3	79 — 86	
CT4	COOLING TOWER RELAY STAGE 4	80 — 86	
LWTR	LEAVING WATER TEMP RESET	51 — 4-20MA — 70	1-2

COMPONENT DESCRIPTION:		TERMINAL BLOCK CONNECTION:	NOTE:
SPC	MAIN SINGLE POINT CONNECTION	DS1	1-1
APS	ALARM RELAY POWER SOURCE	84 — 81	1-8
PPS	PUMP RELAY POWER SOURCE	85 — 86	
ANO	ALARM NORMALLY OPEN	82 — 81	1-8, 1-2
ANC	ALARM NORMALLY CLOSED	83 — 81	
EP1	EVAPORATOR WATER PUMP 1	73 — 86	1-8, 1-6
EP2	EVAPORATOR WATER PUMP 2	74 — 86	
CP1	CONDENSER WATER PUMP 1	75 — 86	1-8, 1-7
CP2	CONDENSER WATER PUMP 2	76 — 86	
EGPM	EVAPORATOR WATER GPM	59 — 4-20MA — 71	1-2





BAS NETWORK

CONNECTION FOR ALL BAS PROTOCOLS WILL BE AT THE INTERFACE SERIAL CARD INSTALLED IN THE CHILLER UNIT CONTROLLER
FOR ADDITIONAL INFORMATION REFER TO THE CORRESPONDING BAS PROTOCOL LITERATURE

BAS LITERATURE:
Modbus: IM 743
LonWorks: IM 735
BACnet Ethernet or IP: IM 837
BACnet MS/TP: IM 906
MT-II CUC Protocol: ED 15062

FIELD CONNECTION NOTES:

1-1 FIELD WIRING MUST BE SELECTED AND INSTALLED IN ACCORDANCE WITH THE NEC STANDARD OR LOCAL CODES. USE COPPER WIRES ONLY WITH AMPACITY BASED ON 75oC RATING
24VAC WIRING, OPTIONAL SENSOR AND DC WIRING MUST BE RUN SEPARATE FROM 115 OR MAIN VOLTAGE WIRING; FOR A MAXIMUM LENGTH OF 50FT THE MINIMUM WIRE GAUGE MUST BE 12GA FOR 115VAC AND 18GA FOR 24VAC

1-2 REFER TO CORRESPONDING UC SOFTWARE LITERATURE FOR PROGRAMMABLE LOGIC FEATURES

1-3 IF FIELD SUPPLIED DRY CONTACTS ARE USED FOR REMOTE START-STOP SWITCHING THEN REMOVE FACTORY INSTALLED JUMPER 569

1-4 EVAPORATOR AND CONDENSER FLOW SWITCHES ARE FACTORY INSTALLED AND MANDATORY; IF FIELD INSTALLED DIFFERENTIAL PRESSURE SWITCHES ARE REQUIRED
THESE MUST BE INSTALLED ACROSS THE VESSEL AND NOT THE PUMP

1-5 ALL WATER PRESSURE DIFFERENTIAL SWITCHES AND AUXILIARY SWITCHES IN WATER PUMP STARTERS MUST BE SUITABLE FOR 24VAC LOW CURRENT APPLICATION
REMOVE ALL CORRESPONDING FACTORY INSTALLED MECHANICAL JUMPERS IF FIELD CONNECTIONS ARE MADE TO TERMINAL BLOCKS EF1, EF2, EF3, CF1, CF2 OR CF3

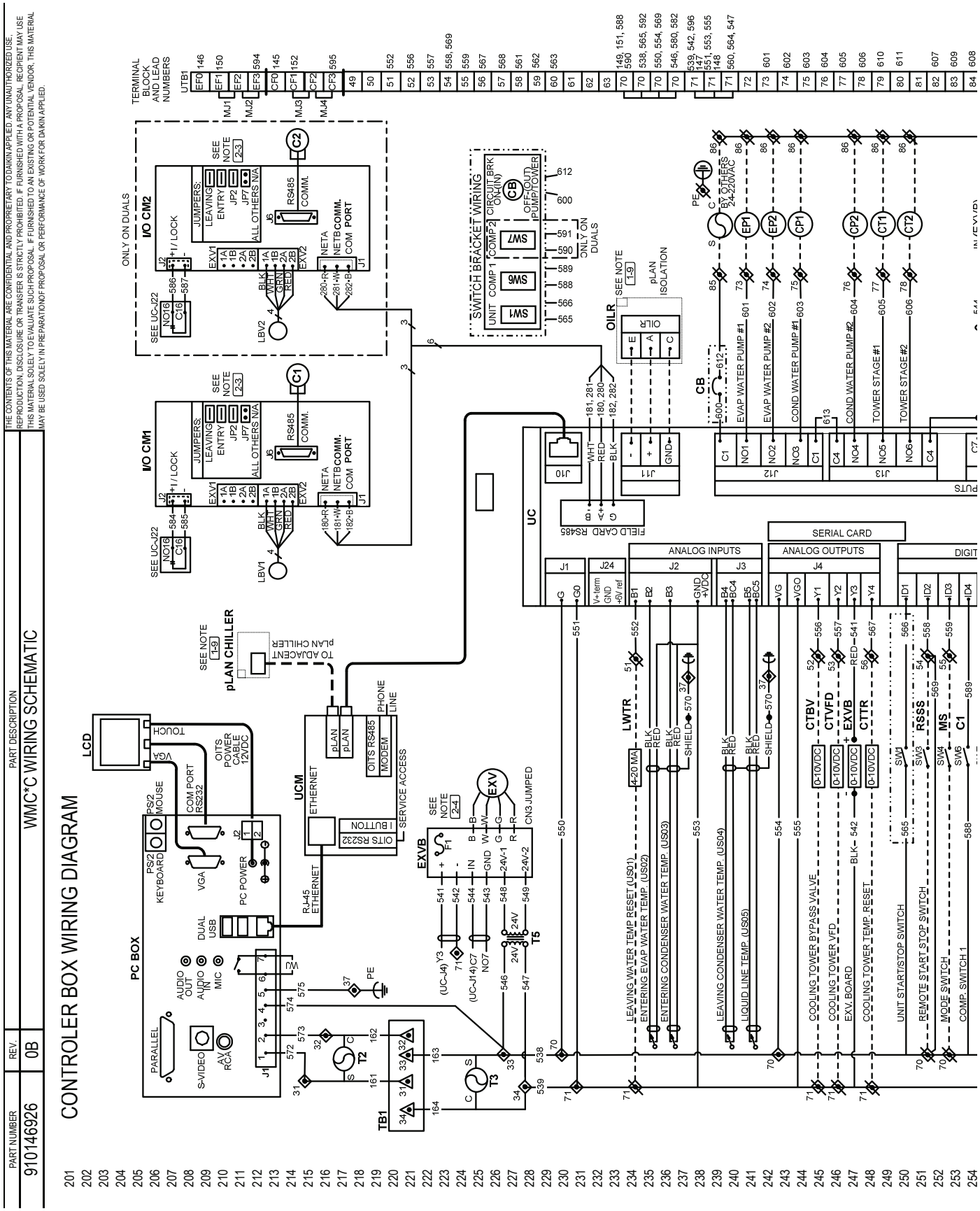
1-6 THIS OPTION WILL CYCLE THE WATER PUMP IN RESPONSE TO CHILLER DEMAND

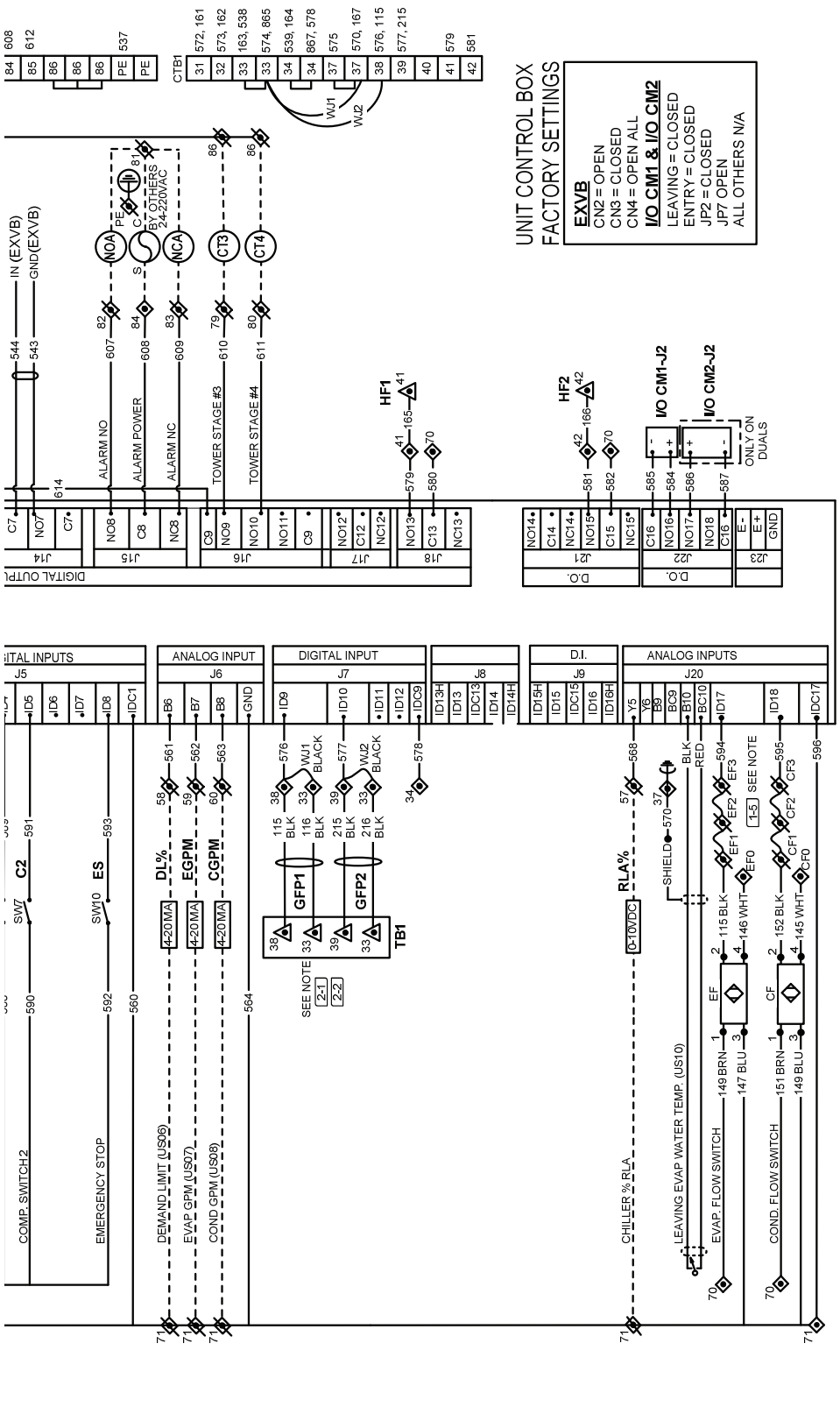
1-7 THE CONDENSER WATER PUMP MUST CYCLE WITH THE CHILLER; FREE COOLING INSTALLATIONS MUST PROVIDE CONDENSER WATER ABOVE 60oF BEFORE STARTING

1-8 FIELD SUPPLIED RELAY COIL RATED FOR 24-230VAC WITH A MAXIMUM 25 VA LOAD

1-9 MULTIPLE CHILLERS CONNECTED VIA p-LAN MUST SHARE THE SAME UNIT CONTROLLER SOFTWARE REVISION; THE MAXIMUM WMC p-LAN SYSTEM IS FOUR CHILLERS
CH-A AND CH-B REPRESENT A DUAL CHILLER CONFIGURATION OR THE LONGEST PATH IN A THREE OR FOUR CHILLER SYSTEM; CH-C AND CH-D REPRESEN THE 3RD AND 4TH CHILLER
A SINGLE 120 OHM 5% MFR FIELD INSTALLED RESISTOR IS REQUIRED IN DUAL CHILLER CONFIGURATION.
THE NUMBER OF OILR MODULES REQUIRED (P/N 330276202) EQUALS THE NUMBER OF CHILLERS IN THE SYSTEM MINUS ONE. REFER TO SB 18-1101-B FOR INSTALLATION DETAILS
USE RS485 SPEC CABLE FOR THE pLAN PATH AND 6-WIRE PHONE CABLES WITH AN RJ11 CONNECTOR FOR OILR TO UC-J11 CONNECTIONS

Figure 13: Controller Box Wiring


CONTROLER BOX WIRING DIAGRAM
PART NUMBER 910146926
REV. 0B
PART DESCRIPTION WMC*C WIRING SCHEMATIC
THE CONTENTS OF THIS MATERIAL ARE CONFIDENTIAL AND PROPRIETARY TO DAIKIN APPLIED. ANY UNAUTHORIZED USE, REPRODUCTION, DISCLOSURE OR TRANSFER IS STRICTLY PROHIBITED. IF FURNISHED WITH A PROPOSAL, RECIPIENT MAY USE THIS MATERIAL SOLELY TO EVALUATE SUCH PROPOSAL. IF FURNISHED TO AN EXISTING OR POTENTIAL VENDOR, THIS MATERIAL MAY BE USED SOLELY IN PREPARATION OF PROPOSAL OR PERFORMANCE OF WORK FOR DAIKIN APPLIED.
TERMINAL BLOCK AND LEAD NUMBERS
I/O CM2
I/O CM1
SWITCH BRACKET WIRING
ONLY ON DUALS
SEE NOTE 1-9
pLAN CHILLER
TO ADJACENT pLAN CHILLER
PC BOX
UCM
UC
EXVB
LWTR
CTBV
CTVFD
EXVB
CTTR
RSSS
MS
C1
EVAP WATER PUMP #1
EVAP WATER PUMP #2
COND WATER PUMP #1
COND WATER PUMP #2
TOWER STAGE #1
TOWER STAGE #2
ANALOG INPUTS
ANALOG OUTPUTS
SERIAL CARD
LEAVING WATER TEMP. RESET (US01)
ENTERING EVAP WATER TEMP. (US02)
ENTERING CONDENSER WATER TEMP. (US03)
LEAVING CONDENSER WATER TEMP. (US04)
LIQUID LINE TEMP. (US05)
COOLING TOWER BYPASS VALVE
COOLING TOWER VFD
EXV. BOARD
COOLING TOWER TEMP. RESET
UNIT START/STOP SWITCH
REMOTE START STOP SWITCH
MODE SWITCH
COMP. SWITCH 1

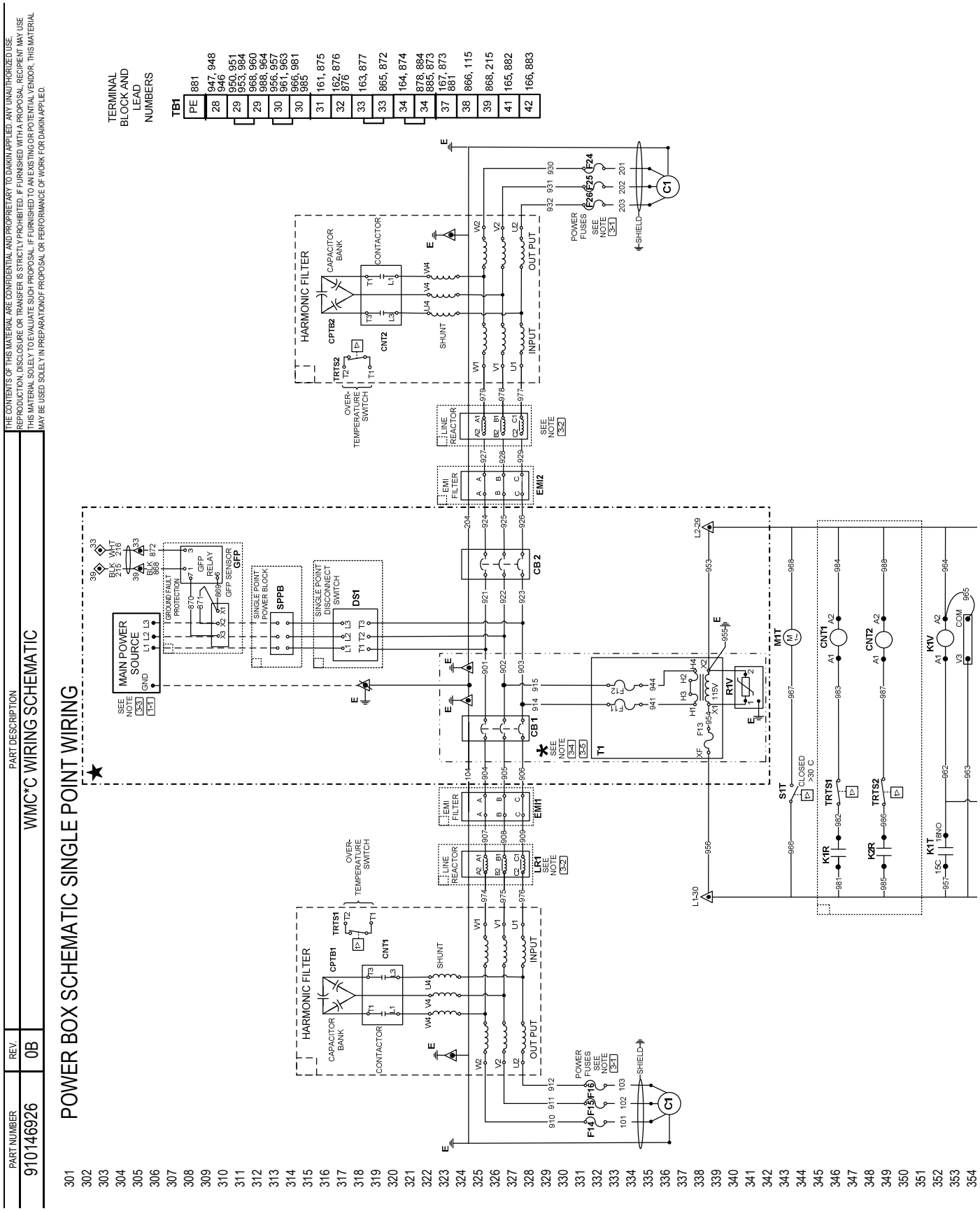


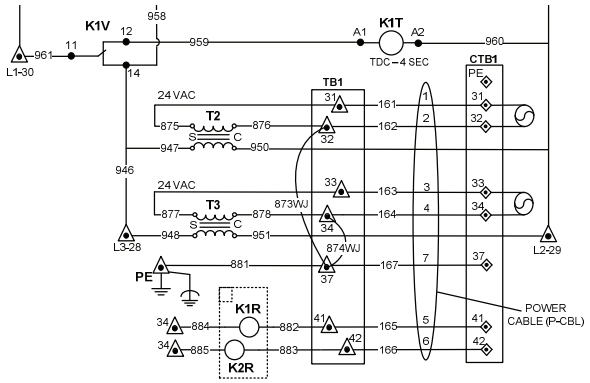
NOTES:

2-1 UNIT CONTROL BOX FACTORY ASSEMBLY:
JUMPERS **WJ1** AND **WJ2** MUST ONLY BE CONNECTED TO TERMINAL BLOCK **33**.

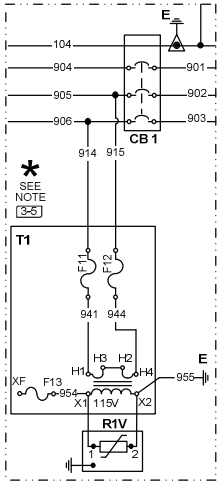
2-2 CHILLER FACTORY ASSEMBLY:
IF OPTIONAL **GFP1** IS USED THEN REMOVE JUMPER **WJ1**. OTHERWISE COMPLETE CONNECTION **WJ1** TO TERMINAL BOLOCK **38**.
IF OPTIONAL **GFP2** IS USED THEN REMOVE JUMPER **WJ2**. OTHERWISE COMPLETE CONNECTION **WJ2** TO TERMINAL BOLOCK **39**.

Figure 14: Power Box Single and Multi Point Wiring

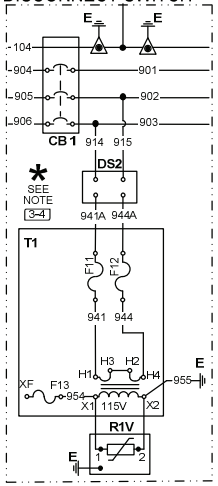




SINGLE COMPRESSOR CHILLERS



LOW VOLTAGE DISCONNECT SWITCH



POWER BOX FACTORY SETTINGS

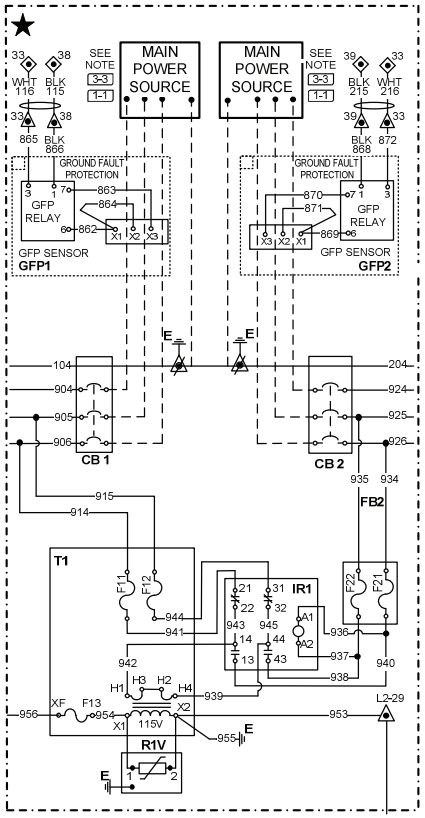
K1T
4 SECONDS = 4 x 1S

K1V
SV = 65%
HYS = 5%
T= 0.1 S
DIP-SW
1 = OFF (1S)
2 = ON (AUTO RESET)
3 = ON (NC)
4 = ON (UNDER VOLTAGE)

S1T
T = 80°F

GFP
SWITCH = NORMAL
TRIP AMPS = B

MULTI POINT WIRING



NOTES:

3-1 FUSES F14 TO F16 AND F24 TO F26 ARE LOCATED INSIDE TT300 COMPRESSORS; FUSSES ARE LOCATED INSIDE THE POWER BOX FOR ALL OTHER MODELS

3-2 REMOVE LINE REACTORS IF HARMONIC FILTER OPTION IS USED.

3-3 REFER TO CHILLER DATA PLATE FOR MAIN POWER RATING

3-4 A CONTROL DISCONNECT SWITCH [DS2] IS REQUIRED FOR ALL SINLE POINT POWER BOXES BUILD WITHOUT OPTIONAL MAIN SINGLE POINT DISCONNECT SWITCH

3-5 WIRES 914 AND 915 (UPSTREAM WIRING TO FUSES F11 AND F12) MUST BE CONNECTED DOWNSTREAM CIRCUIT BREAKER CB1 IN SINGLE COMPRESSOR UNITS ONLY

3-6 CIRCUIT #2 COMPONENTS FOR DUAL COMPRESSOR CHILLERS ONLY.

Communication Setup for Multiple Chillers

On multi-chiller Model WMC applications, up to four Model WMC chillers can be LAN interconnected by field RS485 interconnecting wiring (refer to Lines 165-174 on "Figure 12: Wiring Index") with the addition of an accessory communication isolation board between each chiller connected. (The total number of isolation boards needed is one less than the number of chillers connected.) The isolation board can be purchased with the unit or separately, during or after chiller installation. N-1 boards are required.

In order for interconnection to function properly, some of the chiller control settings will need to be modified. Interconnection between chillers should be made at startup by the McQuay International technician.

NOTE: Chillers connected via pLAN MUST share the same software revision. WMC B and C vintage chillers are compatible for interconnection via pLAN. If trying to connect WMC A vintage chillers to eachother or to B or C vintage chillers, consult a McQuay International service representative. WMC chillers cannot be pLAN interconnected with WSC, WDC, WCC or WME centrifugal chillers.

Long Term Storage

This information applies to new units being stored waiting for startup or to existing units that may be inoperative for an extended period of time.

The chiller must be stored in a dry location indoors and protected from any damage or sources of corrosion. A McQuay International service representative must perform an inspection and leak test of the unit on minimum quarterly schedule, to be paid by the owner or contractor. Daikin Applied will not be responsible for any refrigerant loss during the storage time or for repairs to the unit during the period of storage, or while moving the unit from the original location to a storage facility and back to any new installation location. If there is concern about the possibilities of damage and loss of charge during storage, the customer can have the charge removed and stored in recovery cylinders.

⚠ CAUTION

If the temperature of where the chiller is located is expected to exceed 104°C (40°C), then the refrigerant must be removed.

For additional tasks required, contact McQuay International service.

Pre-Start Checklist – Centrifugal Chillers

Must be completed, signed and provided to Daikin Applied Service Dept. at least 2 weeks prior to requested start date.

Job Name	
Installation Location	
Customer Order Number	
Model Number(s)	
E.O./G.O. Number(s)	

Chilled Water	**Yes**	**No**	**N/A**	**Initials**
Piping Complete	☐	☐	☐	
Water System- flushed, filled, and vented; Water treatment in place	☐	☐	☐	
Pumps installed and operational (rotation checked, strainers installed and cleaned)	☐	☐	☐	
Controls operational (3-way valves, face/bypass dampers, bypass valves, etc.)	☐	☐	☐	
Water system operated and tested; flow meets unit design requirements	☐	☐	☐	
Condenser Water	**Yes**	**No**	**N/A**	**Initials**
Cooling tower flushed, filled, and vented; Water treatment in place	☐	☐	☐	
Pumps installed and operational (rotation checked, strainers installed and cleaned)	☐	☐	☐	
Controls (3-way valves, bypass valves, etc.) operable per IM or IOM	☐	☐	☐	
Water system operated and flow balance to meet unit design requirements	☐	☐	☐	
Electrical	**Yes**	**No**	**N/A**	**Initials**
*115 volt service completed, but not connected to control panel (when applicable)	☐	☐	☐	
Line Power leads(a) connected to starter; *Load leads(b) run from starter to compressor and ready for connection by Service (Do not connect load leads to starter or compressor terminals) See Notes 1, 4	☐	☐	☐	
All interlock wiring complete and compliant with Daikin specifications	☐	☐	☐	
Starter complies with Daikin specifications	☐	☐	☐	
*Oil cooler solenoid wired to control panel as shown on wiring diagram (See Notes)	☐	☐	☐	
Pump starters and interlocks wired	☐	☐	☐	
Cooling tower fans and controls wired	☐	☐	☐	
Wiring complies with National Electrical Code and local codes (See Note 4)	☐	☐	☐	
Condenser pump starting relay (CP1,2) installed and wired (See Note 3)	☐	☐	☐	
Miscellaneous	**Yes**	**No**	**N/A**	**Initials**
*Oil cooled water piping complete. (Units with water cooled oil coolers only)	☐	☐	☐	
Relief valve piping complete (per local codes	☐	☐	☐	
Thermometers, wells, gauges, control, etc., installed	☐	☐	☐	
Minimum system load of 80% capacity available for testing/adjusting controls	☐	☐	☐	
Document Attached: Technical Breakdown from DaikinTools	☐	☐	☐	
Document Attached: Final Order Acknowledgement	☐	☐	☐	

Notes: The most common problems delaying start-up and affecting unit reliability are:

1. Field installed compressor motor power supply leads too small. Questions: Contact the local Daikin Applied sales rep* State size, number and type of conductors and conduits installed:
   a. From Line Power supply to starter _____
   b. From starter to chiller unit (remote mounted) _____
2. Centrifugal chillers with water-cooled oil coolers must have a 115-volt normally-closed water solenoid valve installed in the oil cooler water supply line. Daikin recommends ASCO Type 8210B27 solenoid valve or approved equal and 40-mesh strainer. Daikin does not supply these components.
3. A 115 volt field supplied relay (CP1,2) must be used to start and stop condenser water pump on most applications. Cold condenser water must not flow through condenser during compressor off cycle. Provisions have been made in control center for connecting CP relay, but must not have a rating in excess of 100 VA.

4 Refer to NEC Article 430-22 (a)

*** Does Not Apply to Magnetic Bearing Chillers (WMC/WME)**

Contractor Representative

Signed: _____
Name: _____
Company: _____
Date: _____
Phone/Email: _____

Daikin Applied Sales Representative

Signed: _____
Name: _____
Company: _____
Date: _____
Phone/Email: _____

©2014 Daikin Applied

Form SF-111

MAY 2014

Operator Responsibilities

It is important that the operator become familiar with the equipment and the system before attempting operation. During the initial startup of the chiller, the McQuay International technician will be available to answer any questions and instruct the proper operating procedures. It is recommended that the operator maintain an operating log for each individual chiller unit. In addition, a separate maintenance log should be kept of the periodic maintenance and servicing activities.

Operator Schools

Training courses for Magnitude® Centrifugal Maintenance and Operation are held through the year at the Daikin Learning Institute in Staunton, Virginia. The school duration is three and one-half days and includes instruction on basic refrigeration, MicroTech® II controllers, enhancing chiller efficiency and reliability, MicroTech® II troubleshooting, system components, and other related subjects. For more information, visit us at www.DaikinApplied.com and click on Training or call the Training Department. Refer to the back cover of this document for contact information.

Sequence of Unit Operation

The following is a general chiller sequence of operation for Magnitude® Model WMC chillers. Certain conditions and chiller alarms may alter this sequence, but the chiller's objective is to achieve the target temperature of the leaving water.

1. **Chiller enabled**

   With the chiller enabled via its onboard interlocks and selected external control source, it will start the evaporator pump and check for flow and chiller load.

2. **Water flow and load proven**

   Once evaporator flow has been confirmed and the chiller load proven, compressor wear balancing logic will determine which compressor to start as the Lead.

3. **Lead compressor start**

   As the Lead compressor approaches its maximum capacity it will assess the need for the Lag compressor. If the Lag compressor is needed, the Lead compressor will signal the Lag compressor to start, and may adjust its capacity to assist the Lag compressor start.

4. **Lag compressor start**

   Once started, the Lag compressor will quickly ramp up to balance the chiller load between the two compressors.

5. **Dual compressor loading**

   As building load increases, the compressors will load up maximizing the Inlet Guide Vane (IGV) position and impeller speed. Maximum capacity at a given operating condition can be found either when the compressors have reached their maximum speed limit (Mechanical limitation) or when the compressors have reached the chiller's Rated Load Amperage (Electrical limitation).

6. **Dual compressor unloading**

   As load decreases, the compressors will unload to sustain the water temperature set point by reducing speed until the minimum speed limit has been reached. If further unloading is required, the IGV assemblies will close as required to satisfy the load.

7. **Staging down to one compressor running**

   With the chiller running two compressors on condition and the building load reducing to the point that one compressor can carry the load, compressor wear balancing logic will again determine which compressor to shutdown.

8. **Chiller shutdown**

   The remaining compressor will adjust capacity to manage the chiller load until the load increases to the point where another compressor is needed, or the load reduces below the minimum capacity of one compressor and the leaving water temperature goes below set point and reaches the stop delta temperature. Anytime the chiller is disabled, it will perform an orderly unload and shutdown both compressors.

Unit Enabling/Disabling

There are multiple switches that will enable and disable the chiller and its compressors:

1. Unit Switch - The top switch on the switch bracket that is mounted inside the control box.
2. Compressor 1 Switch - Located underneath the Unit Switch on the switch bracket.
3. Compressor 2 Switch - Located underneath the Compressor 1 Switch on the switch bracket.
4. External Switch - Located on the outer, left side of the control box.
5. Remote Switch - Optional. Replaces a jumper between Field Terminals 54 and 70 (see "Figure 12: Wiring Index" on page 12).

The switches listed above work in conjunction with the "Control Source" that is selected in the OITS via the MODES Setpoint Screen using Setpoint button #3. (See Figure 44 and Table 10 on page 38.) The three options for "Control Source" are:

1. Switches - This is the default mode. This mode will ignore BAS commands.
2. Local - When this mode is set, a STOP button and an AUTO button will appear at the top of the OITS screens, as shown in Figure 16 on page 22. **This mode will ignore all functionality of a connected Remote Switch**. It will also ignore BAS commands.
3. BAS - This mode adds BAS capability to the Switches functionality.

Enabling and disabling the unit and its compressors using the switches in conjunction with the selected "Control Source" are discussed next.

Enabling

To enable the chiller and its compressors when the “Control Source” is “Switches” or “BAS,” all four rocker switches and the Remote Switch, if included, need to be closed (in the ON position).

If the “Control Source” is set to “Local” and a Remote Switch is being used, the position of the Remote Switch will be ignored. In that case, only the four rocker switches need to be closed. Once these four rocker switches are closed, press the AUTO button on the OITS to enable the chiller in “Local” mode.

Disabling

Each of the four switches located on the unit have a different functionality in terms of disabling. The descriptions below apply if the “Control Source” on the OITS MODES Setpoint Screen is set to “Switches” or “BAS.”

1. Unit Switch- When placed in the OFF position while the chiller is running, the Unit Switch will shutdown the chiller in a normal controlled sequence and will stop each compressor that is running. This switch will leave the entire chiller disabled until it is set in the ON position.
2. Compressor 1 Switch - When placed in the OFF position, this switch prevents Compressor 1 from being used in the normal auto-sequencing of the compressors. If Compressor 1 is running when this switch is placed in the OFF position, the compressor will perform a “rapid stop” different from the stop caused from placing the Unit Switch in the OFF position.
3. Compressor 2 Switch - This switch functions in the same manner as the Compressor 1 Switch but it controls Compressor 2 instead.
4. External Switch - If placed in the OFF position, this switch will cause both compressors to do a “rapid stop” together. In other words, putting this switch in the OFF position has the same effect as placing both the Compressor 1 Switch and the Compressor 2 Switch in the OFF position. The External Switch will leave the unit disabled until it is placed in the ON position.
5. Remote Switch - This switch will disable the chiller in a similar manner as the Unit Switch.

If the “Control Source” on the OITS MODES Setpoint Screen is set to “Local,” press the STOP button on the OITS to disable the chiller. This method of disabling will cause the chiller to act in a similar manner as when it is disabled using the Unit Switch in the “Switches” or “BAS” mode.

Operator Interface Touch Screen (OITS)

The following sections outline the operation of the OITS panel.

OITS On/Off

The OITS is turned on/off with a switch located at the lower front of the display panel. Screen control buttons are located to either side of it and elicit on-screen prompts when pressed. The OITS is equipped with a screen saver (a blank, black screen) that can be enabled if desired. If the screen is black, touch it first to be sure it is on before using the ON/OFF button.

Chiller Operation Without the OITS

The Operator Interface Touch Screen (OITS) communicates with the controller, displaying data and transmitting touch screen inputs to the controllers. It does no actual controlling and the chiller can operate without it. Should the touch screen become inoperable, no commands are necessary for continuing unit operation. All normal inputs and outputs will remain functional. The unit controller can be used to view operational data, to clear alarms, and to change setpoints, if necessary. See "The Controller" section starting on page 48 for more information.

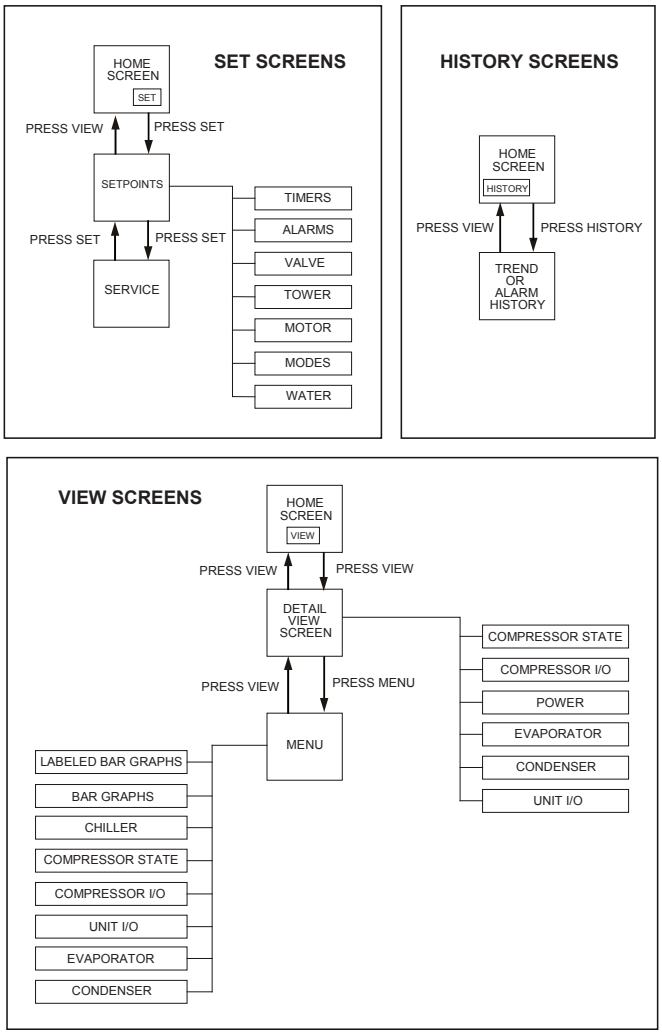
Navigation Summary

The Home View Screen, see Figure 16 on page 22, is usually left on. This screen contains the AUTO and STOP buttons used to start and stop the unit when in “Local” control mode. Other groups of screens can be accessed from the Home View Screen by pressing one of three buttons on the bottom of the screen: HISTORY, VIEW, or SET.

- HISTORY: See the "HISTORY Screens" section starting on page 41 for more information.
- VIEW: See the "VIEW Screens" section starting on page 22 for more information.
- SET: See the "SET Screens" section starting on page 26 for more information.

Figure 15 on page 22 illustrates the arrangement of the various screens available on the OITS. A few minutes practice on an actual OITS should provide an acceptable level of confidence in navigating through the screens.

Figure 15: OITS Screen Layout



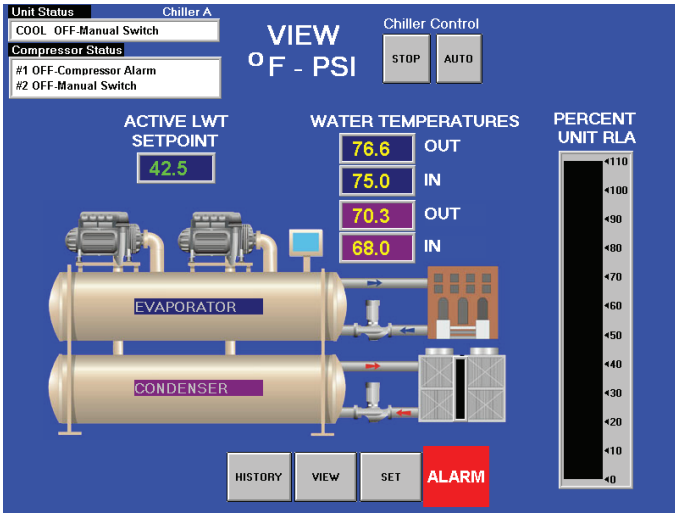
VIEW Screens

View screens are used for looking at unit status and conditions.

Home View Screen

The Home View Screen (Figure 16) shows the basic operating condition of the chiller and is the screen that is normally left on. Note that the chiller displayed on this screen, as well as on all other screens that display an image of the chiller, will show either one or two compressors depending on the chiller model.

Figure 16: Home View Screen



Superimposed on the Home View Screen is:

(I) Alarm

- A red ALARM button will appear to the right of the SET button should an alarm occur. This ALARM button will appear on most screens in the case of an alarm. For display purposes, the rest of the screen images presented in this manual will not show the ALARM button.
- Any type of alarm will cause the ALARM button to appear. Pressing the ALARM button will bring up the Active Alarms Screen (Figure 52 on page 43) to view the alarm details. For more information on alarms, see page 42 through page 47.

(II) Information

- Chilled water setpoint (ACTIVE LWT SETPOINT)
- Entering and leaving evaporator water temperatures
- Entering and leaving condenser water temperatures
- Percent unit RLA
- UNIT STATUS, which is MODE followed by STATE followed by the SOURCE that is the device or signal that created the STATE. The possible combinations are shown in Table 3.

Table 3: UNIT STATUS Possibilities

MODE	STATE	SOURCE
COOL	OFF	Manual Switch
	SHUTDOWN	Remote Switch
	AUTO	Local
		BAS Network

- COMPRESSOR STATUS, shown for both compressor #1 and #2, is MODE followed by STATE followed by the SOURCE that is the device or signal that created the STATE. The possible combinations are shown in Table 4.

Table 4: COMPRESSOR STATUS Possibilities

Complete STATUS Text (in priority sequence)	Notes
OFF Manual Switch	Reason for the compressor being off
OFF Compressor Alarm	
OFF Unit State	
OFF Evap Flow/Re-circulate	
OFF Start to Start Timer=xxx	
OFF Stop to Start Timer=xxx	
OFF Staging (Next ON)	
OFF Awaiting Load	
RUN Unload Vanes-Max Amps	Overrides water temperature command
RUN Hold Vanes-Max Amps	
RUN Load	Normal operation
RUN Hold	
RUN Unload	
SHUTDOWN Unload	Unloading during the shutdown sequence

NOTE: Timer countdown values will be shown where "xxx" is shown in Table 4.

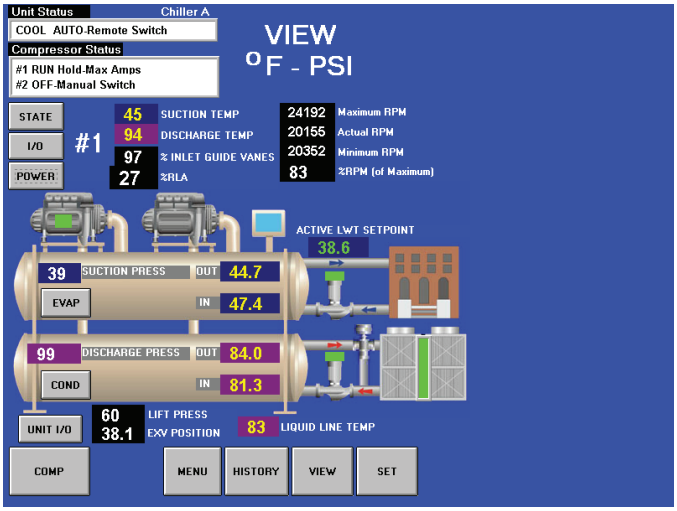
(III) Action Buttons

- Chiller Control: AUTO button (normal start) and STOP button (normal shutdown). **These buttons are only visible and active when the control is in the "Local" mode.** This eliminates the possibility of inadvertently shutting off the unit locally when it is under control of a remote signal such as a BAS. The rest of the screen images shown in this manual will not display the AUTO and STOP buttons; however, they will be visible on the actual OITS if in "Local" mode.
- HISTORY button: Toggles between the Trend History Screen (Figure 49 on page 41) and the Alarm History Screen (Figure 50 on page 42).
- VIEW button: Shows details about the unit status and conditions. Pressing this button will toggle between the Home View Screen (Figure 16) and the Detail View Screen (Figure 17).
- SET button: Toggles between the Setpoint Screens (descriptions start on page 26) that are used for changing setpoints and the Service Screen (Figure 47 on page 40).

Detail View Screen

Pressing the VIEW button on the bottom of the Home View Screen accesses the Detail View Screen, shown in Figure 17. The Detail View Screen can also be accessed by pressing the VIEW button from any other screen that contains the VIEW button.

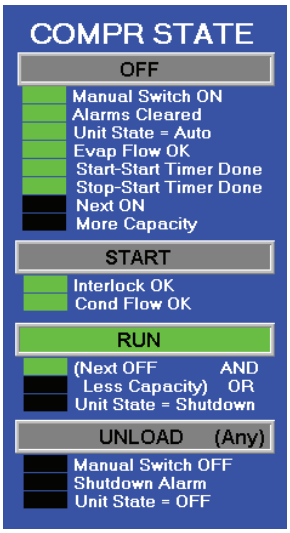
Figure 17: Detail View Screen



Data for one compressor is shown at a time on the Detail View Screen. Pressing the COMP button in the lower-left hand corner of the screen will toggle between compressor #1 and compressor #2.

When first booted up, the Detail View Screen will be blank on the right side, as shown in Figure 17. Various information will appear on the right side of the Detail View Screen by pressing available buttons. For example, pressing the STATE button will bring up a display of the Compressor State Information, as shown in Figure 18, on the right side of the Detail View Screen. Use the COMP button to toggle between the two compressors' data.

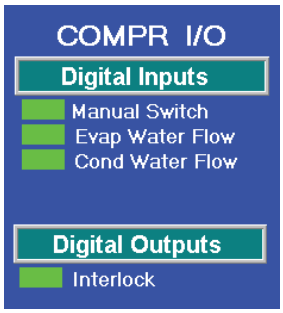
Figure 18: Compressor State Information



The Compressor State Information is basically a compilation of the events that the chiller sequences through at startup. A green light indicates that a particular sequence requirement has been satisfied. It is recommended that this information be viewed during the startup sequence. One can see the requirements light up as they are met and quickly see why a non-start may have occurred. For instance, the “Evap Flow OK” item will light when the evaporator flow switch is closed by flow. The bottom sections (from “RUN” down) of the Compressor State Information are in effect during the shut down process. The sequence transitions back to OFF at this point and the OFF light will be illuminated.

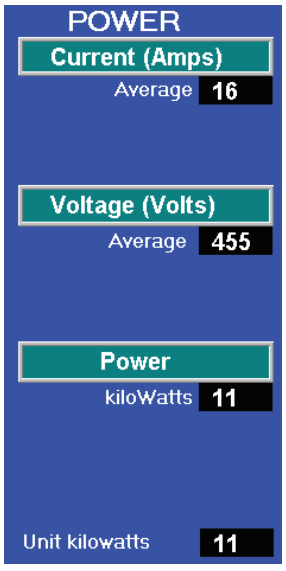
Pressing the I/O button on the Detail View Screen displays the status of the compressor digital inputs and outputs, as shown in Figure 19, on the right side of the Detail View Screen. Use the COMP button to toggle between the two compressors’ data. Many of the inputs and outputs shown in the Compressor Inputs/Outputs Information will also appear under the Compressor State Information (Figure 18) since they are part of the startup sequence and define the compressor state at any given time.

Figure 19: Compressor Inputs/Outputs Information



Pressing the POWER button on the Detail View Screen will display the current, voltage, and power of the chiller, as shown in Figure 20.

Figure 20: Power Information



Pressing the EVAP or COND buttons on Detail View Screen will display pertinent vessel temperatures and pressures. The Evaporator Information and Condenser Information are shown in Figure 21 and Figure 22, respectively.

Figure 21: Evaporator Information

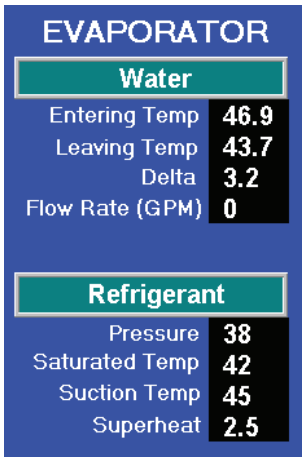
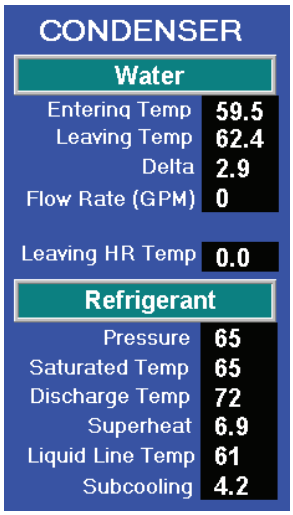
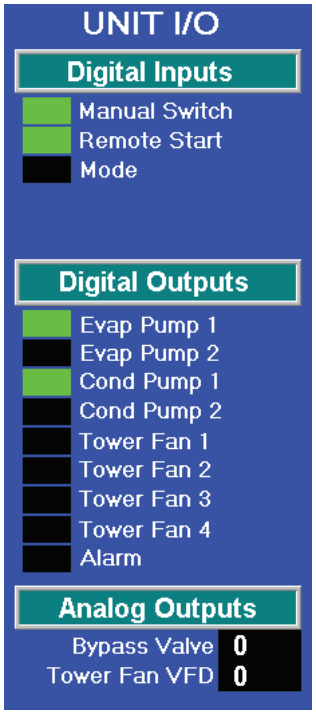


Figure 22: Condenser Information



Pressing the UNIT I/O button on the Detail View Screen displays the unit digital inputs, digital outputs, and analog outputs, as shown in Figure 23. Note that operation of the condenser and evaporator water pumps and operation of the tower constitute most of the data flow. An illuminated block indicates that either an input or output signal exists.

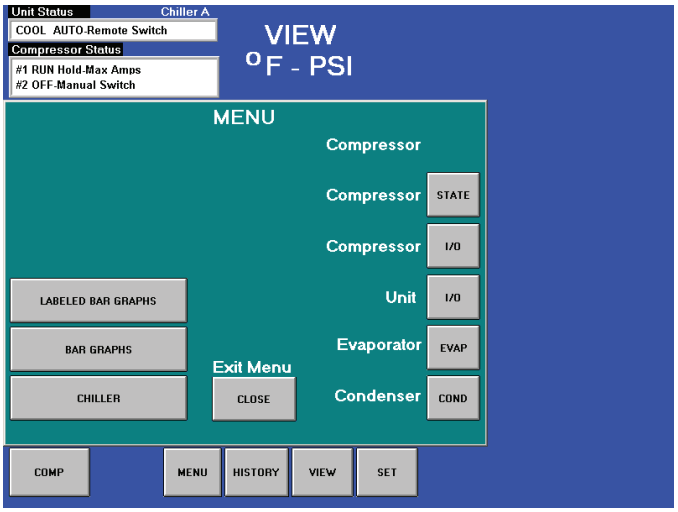
Figure 23: Unit Inputs/Outputs Information



View Menu Screen

The View Menu Screen (Figure 24) is accessed by pressing the MENU button from the Detail View Screen (Figure 17).

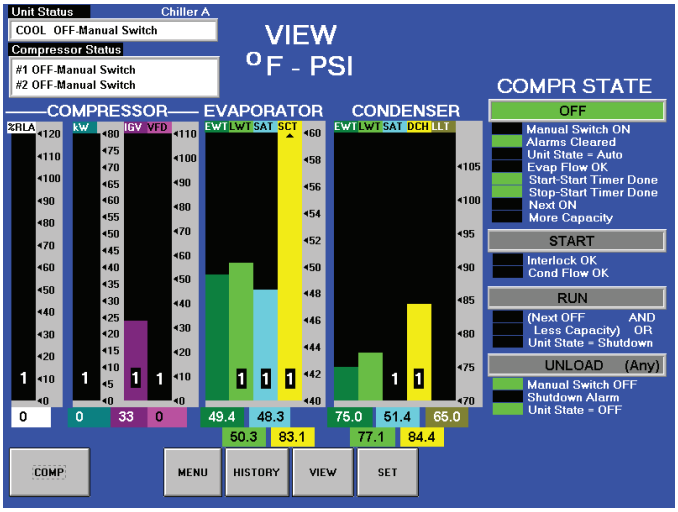
Figure 24: View Menu Screen



As with the Detail View Screen, information will appear on the right side of the View Menu Screen by pressing available buttons. Much of the available information is the same as what is found on the Detail View Screen. For example, pressing the Compressor STATE, Compressor I/O, Unit I/O, EVAP, or COND buttons will display the same information as what is available from the Detail View Screen. Reference the Information figures in the "Detail View Screen" section starting on page 23 for more details.

The Bar Graphs Screen (Figure 25) is accessed by pressing the BAR GRAPHS button from the View Menu Screen (Figure 24). If information is present on the right side of the View Menu Screen before pressing the BAR GRAPHS button, that information will appear to the right of the Bar Graphs Screen as well. In Figure 25, for example, the Compressor State Information is shown to the right of the screen. Bar graphs with labels can be viewed by pressing the LABELED BAR GRAPHS button on the View Menu Screen.

Figure 25: Bar Graphs Screen



SET Screens

The Setpoint Screens on the Operator Interface Touch Screen (OITS) are used to input the many setpoints associated with equipment of this type. MicroTech® II provides a simple method for accomplishing this. (Note that if the OITS is unavailable, the controller can be used to change setpoints.) Appropriate setpoints are factory set and checked by a McQuay International service representative during commissioning; however, adjustments and changes are often required to meet job conditions. Certain settings involving pumps and tower operation are field set.

Pressing the SET button found on almost every screen accesses the last Setpoint Screen used or the Service Screen, whichever of the two was used last. When in any Setpoint Screen, pressing the SET button again will toggle to the Service Screen, shown in Figure 47 on page 40. A typical Setpoint Screen is displayed in Figure 26 below.

Figure 26: A Typical Setpoint Screen

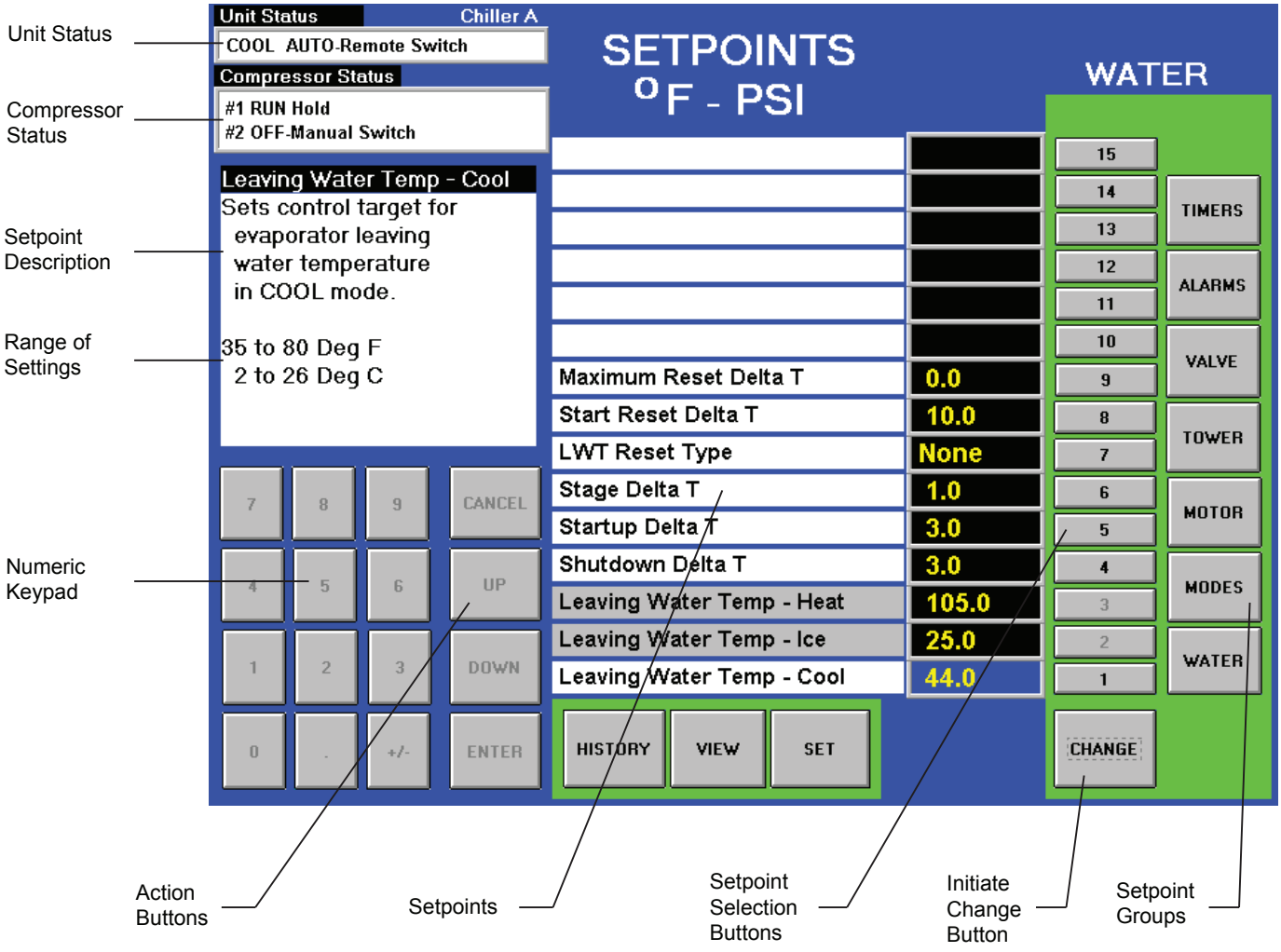


Figure 26 shows the WATER Setpoint Screen. The various setpoint groups are in a column on the right side of the screen. Each button contains a number of setpoints grouped together by similar content. The WATER button, for example, contains various setpoints relating to water temperature setpoints.

NOTE: Some setpoints that do not apply to a particular unit application may still be listed on the screen but will be grayed out. They will be inactive and can be ignored.

The numbered Setpoint Selection buttons are pressed to select a particular setpoint. The selected setpoint will appear in blue on the screen and a description of it (with the range of available settings) will appear in the upper left-hand box.

Procedure for Changing a Setpoint

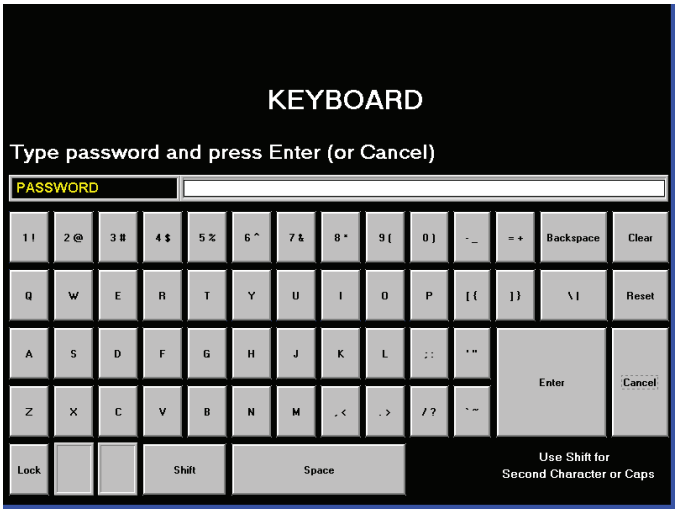
A list of setpoints along with their default value, available setting range, and password authority can be found in the tables under each Setpoint Screen, starting on page 28. Follow the steps listed below in order to change a setpoint.

⚠ CAUTION

Many setpoints are interactive. Changes may have an adverse effect on chiller operation. Only trained operators should be allowed to change chiller setpoints.

1. Press the applicable Setpoint Group. (A complete explanation of setpoint content of each group follows this section.)
2. Select the desired setpoint by pressing the numbered Setpoint Selection button.
3. Press the CHANGE button to change a setpoint value. The Keyboard Screen, as shown in Figure 27, will be turned on automatically to facilitate entering the password.

Figure 27: Keyboard Screen



4. Input the appropriate password number. (Use 100 for operator level or 2001 for manager level. The technician level password is only provided to Daikin Applied technicians) There is a small delay between pressing the keypad and recording the entry. Be sure that an asterisk appears in the window before pressing the next number.
5. After inputting the password on the Keyboard Screen, press ENTER to return to the Setpoint Screen. The password will remain open for 15 minutes after initiation and does not need to be re-entered during this period.
6. Press CHANGE again on the Setpoint Screen. The right side of the screen will become inactive (the background will turn blue). The Numeric Keypad and Action buttons in the lower left-hand corner of the screen will become active (the background will turn green).
7. Setpoints with numeric values can be changed in two ways:
   - Select the desired value by pressing the numbered buttons on the Numeric Keypad. Press ENTER to enter the value or CANCEL to cancel the transaction.
   - Press the UP or DOWN button to increase or decrease the value displayed. Press ENTER to enter the value or CANCEL to cancel the transaction.

   Some setpoints are text rather than numeric values. For example, LWT Reset Type on the WATER Setpoint Screen (Figure 45 on page 39) can be “None” or “4-20 ma.” The selection can be made by toggling between choices using the UP or DOWN button. If dashed lines appear in the setpoint window it means that toggling in that direction can go no further, so reverse direction. Press ENTER to enter the choice or CANCEL to cancel the transaction.

   Once CHANGE is selected, the CANCEL or ENTER buttons must be pressed before another setpoint can be selected.
8. Additional setpoints can be changed by selecting another setpoint on the screen using the Setpoint Selection buttons or by selecting an entirely new group of setpoints using the Setpoint Group buttons.

Explanation of Setpoints

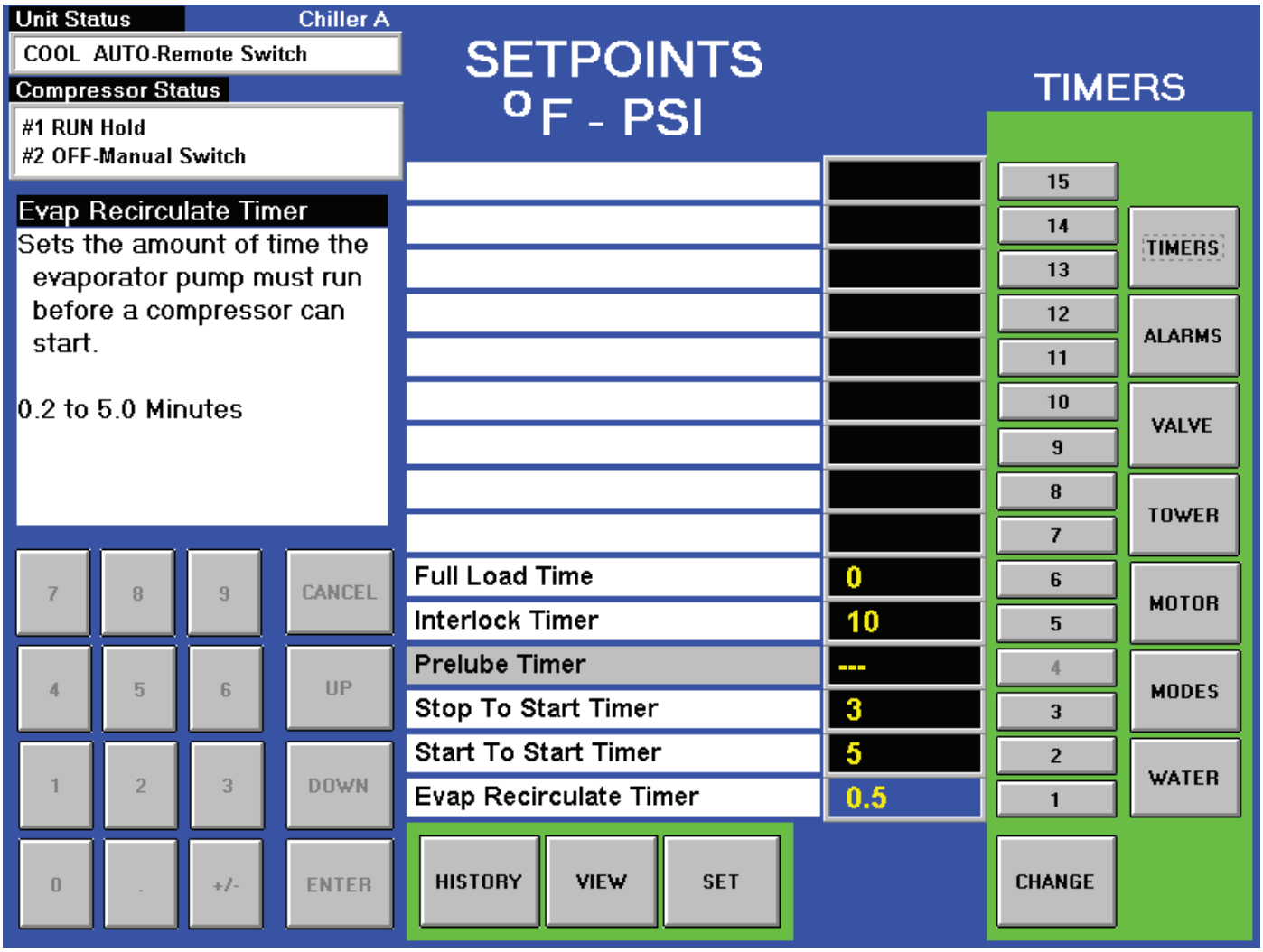
There are seven setpoint groups shown on the Setpoint Screens:

1. TIMERS, sets timers such as start-to-start, etc.
2. ALARMS, sets the limit and shutdown alarms.
3. VALVE, sets the parameters for operation of an optional field-installed tower bypass valve.
4. TOWER, selects the method of controlling the cooling tower and sets the parameters for fan staging/VFD.
5. MOTOR, selects motor related setpoints such as amp limits. Also has maximum and minimum rate of change of chilled water temperature.
6. MODES, selects various modes of operation such as control source, multiple compressor staging, pump staging, BAS protocol, etc.
7. WATER, sets leaving water temperature setpoint, start and stop delta-T, resets, etc.

Each of the seven setpoint groups are detailed in the following pages.

TIMERS Setpoints

Figure 28: TIMERS Setpoint Screen



NOTE: Grayed out setpoints do not apply to this model chiller.

Table 5: TIMERS Setpoint Settings

Description	No.	Default	Range	Password	Comments
Full Load Timer	6	300 sec	0 to 999 sec	M	Time compressor must load (without unloading) before vanes are considered fully open. This setpoint does not apply to this model chiller.
Interlock Timer	5	10 sec	10 to 240 sec	M	Maximum time allowed before interlock confirmation from compressor
Stop-Start Timer	3	3 min	3 to 20 min	M	Time from when compressor stops to when it can restart
Start-Start Timer	2	40 min	15 to 60 min	M	Time from when compressor starts to when it can start again
Evap Recirculate Timer	1	30 sec	0.2 to 5 min	M	Time that evaporator pump must run before compressor start

NOTE: In Table 5 and in the rest of the Setpoint tables on the following pages, the letters in the Password column refer to the following:

- O = Operator Level (the password number for operator level is 100)
- M = Manager Level (the password number for manager level is 2001)
- T = Technician Level (the password number for technician level is only provided to McQuay International technicians)

ALARMS Setpoints

Figure 29: ALARMS Setpoint Screen

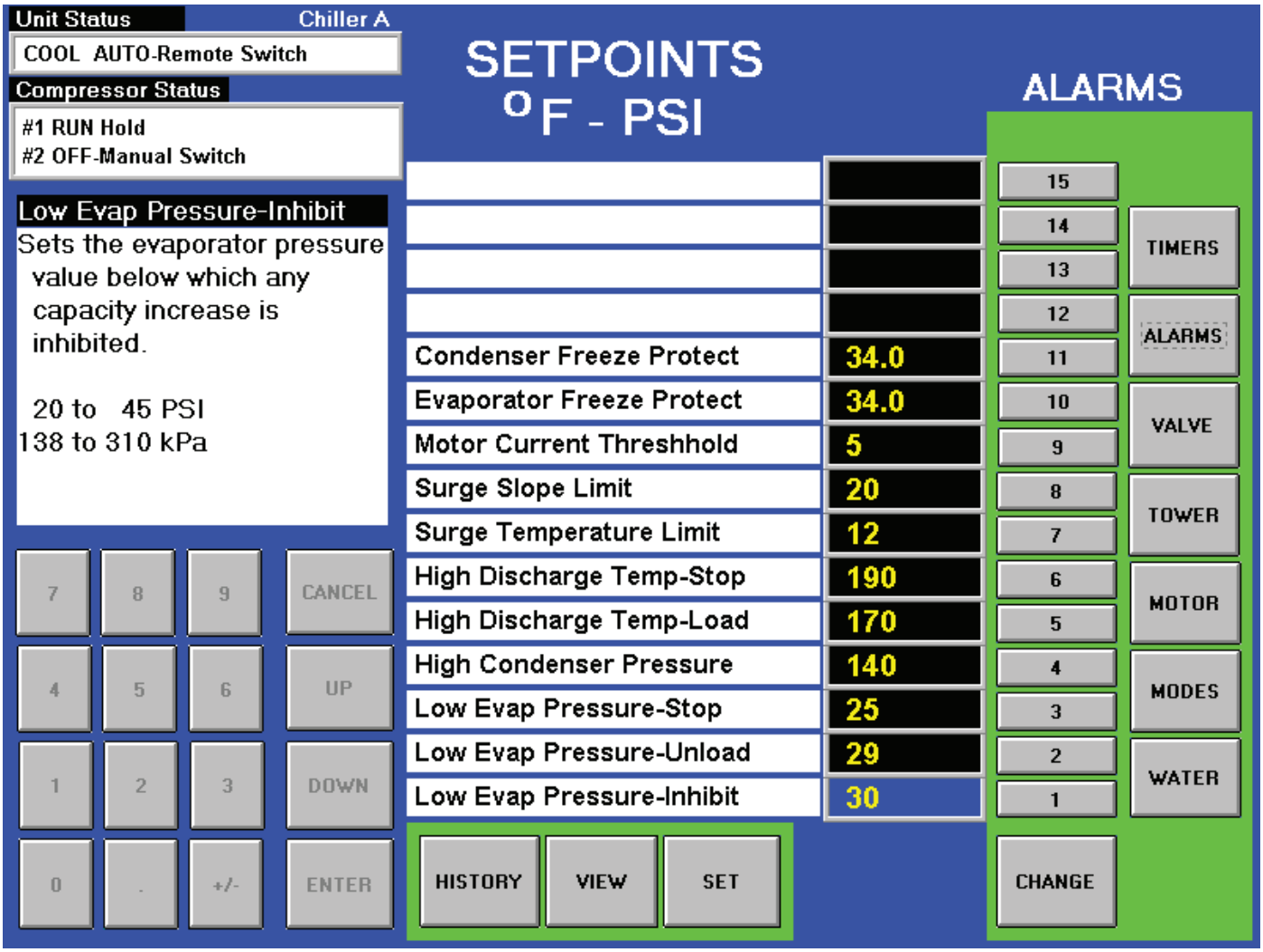


Table 6: ALARMS Setpoint Settings

Description	No.	Default	Range	Password	Comments
Condenser Freeze Protect	11	34.0 °F	-9.0 to 45.0 °F	T	Minimum condenser saturated temperature to start pump
Evaporator Freeze Protect	10	34.0 °F	-9.0 to 45.0 °F	T	Minimum evaporator saturated temperature to start pump
Motor Current Threshold	9	10%	1 to 20%	T	Min %RLA to consider that the is motor off
Surge Slope Limit	8	20 °F/min	1 to 99 deg F/min	T	Surge temperature (ST) slope value above which alarm occurs. Active only if ST>SP7 at start
Surge Temperature Limit	7	50 °F	2 to 45 °F	T	At start, Surge Temp (ST) is compared to this SP. Alarm at ST>2x SP.
High Discharge Temp-Stop	6	190 °F	120 to 240 °F	T	Max discharge temp to shut down compressor
High Discharge Temp-Load	5	170 °F	120 to 240 °F	T	Sets discharge temp above which a forced capacity increase occurs
High Condenser Pressure	4	140 psi	120 to 240 psi	T	Max discharge pressure, stop compressor
Low Evap Pressure, Stop	3	26 psi	10 to 45 psi	T	Min evap pressure – stop compressor
Low Evap Pressure-Unload	2	31 psi	20 to 45 psi	T	Min evap pressure – unload compressor
Low Evap Pressure-Inhibit	1	33 psi	20 to 45 psi	T	Min evap pressure – inhibit loading

NOTE: The setpoints listed in Table 6 should only be changed by a McQuay International technician. Contact a McQuay International service representative for more information.

Cooling Tower Bypass VALVE Setpoints

Figure 30: Tower Bypass VALVE Setpoint Screen

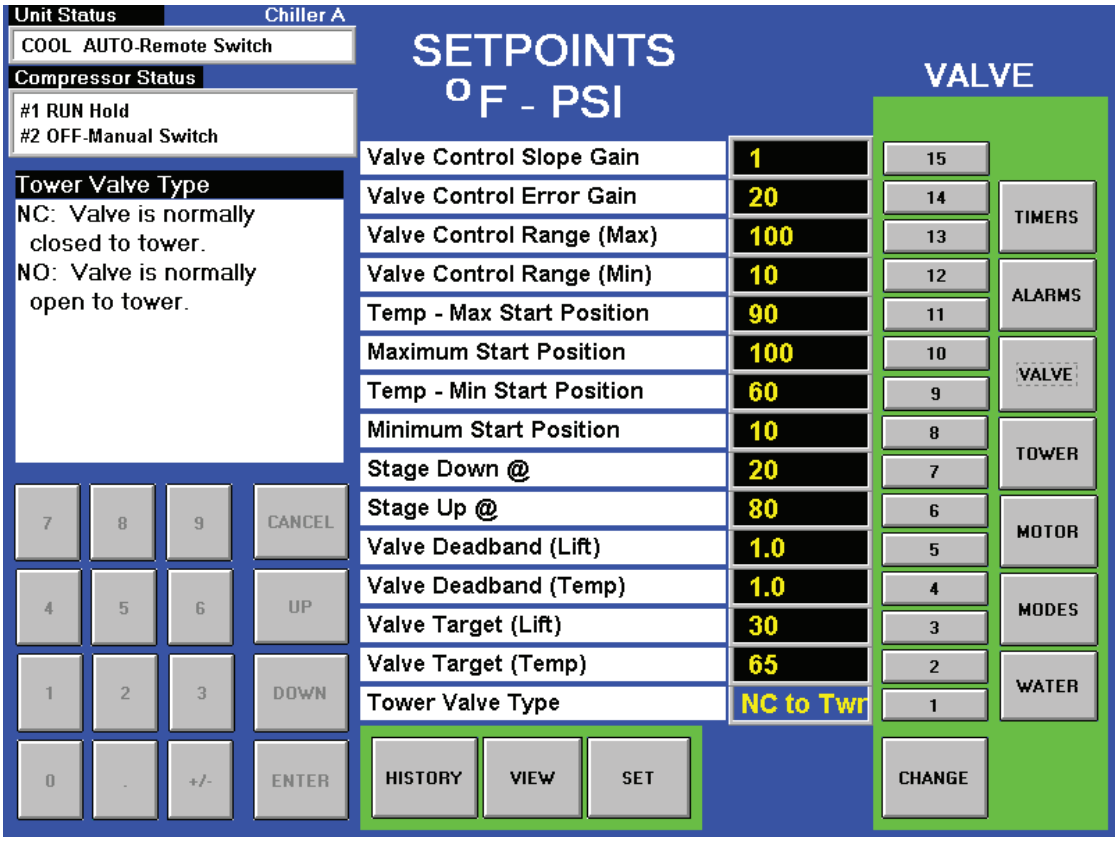


Table 7: Tower Bypass VALVE Setpoint Settings (See page 32 for complete explanation.)

Description	No.	Default	Range	Password	Comments
Valve Control Slope Gain	15	1	0 to 99	T	Control gain for temperature (or lift) slope
Valve Control Error Gain	14	20	0 to 99	T	Control gain for temperature (or lift) error
Valve Control Range (Max)	13	100%	0 to 100%	T	Maximum valve position, overrides all other settings
Valve Control Range (Min)	12	10%	0 to 100%	T	Minimum valve position, overrides all other settings
Temp - Max Start Position	11	90 °F	0 to 100 °F	T	Condenser EWT at which valve should be open to tower. Valve position is set to SP8
Maximum Start Position	10	100%	0 to 100%	T	Initial valve position when condenser EWT is at or above Setpoint # 9
Temp - Min Position	9	60 °F	0 to 100 °F	T	Condenser EWT at which initial valve position is set to Setpoint # 6
Minimum Start Position	8	10%	0 to 100%	T	Initial position of valve when condenser EWT is at or below Setpoint # 9
Stage Down @	7	20%	0 to 100%	T	Valve position below which the fans can stage down (Tower - Setpoint #2 = Valve Stage Down VFD speed below which the next fan speed can turn off (Tower - Setpoint # 2 = valve/VFD
Stage Up @	6	80%	0 to 100%	T	Valve position above which the fans can stage up (Tower - Setpoint #2 = Valve Stage Down VFD speed above which the next fan speed can turn on (Tower - Setpoint # 2 = valve/VFD
Valve Deadband (Lift)	5	1.0 psi	0 to 20.0 psi	T	Control deadband, Tower - Setpoint #1=Lift
Valve Deadband (Temp)	4	1.0 °F	0 to 10.0 °F	T	Control deadband, Tower Setpoint #1=Temp
Valve Target (Lift)	3	30 psi	10 to 130 psi	T	Target for lift pressure (Tower - Setpoint #1= Lift), Works with Setpoint # 5
Valve Target (Temp)	2	65 °F	40 to 120 °F	T	Target for condenser EWT (Tower Setpoint #1= Temp), Works with Setpoint # 4
Tower Valve Type	1	NC (To Tower)	NC, NO	T	Normally closed (NC) or normal open (NO) to tower

NOTE: Table 7 relies on Setpoints 1 and 2 in Table 8 on page 31. The setpoints listed in Table 7 should only be changed by a McQuay International technician. Contact a McQuay International service representative for more information.

Cooling TOWER Fan Setpoints

Figure 31: Cooling TOWER Fan Setpoint Screen

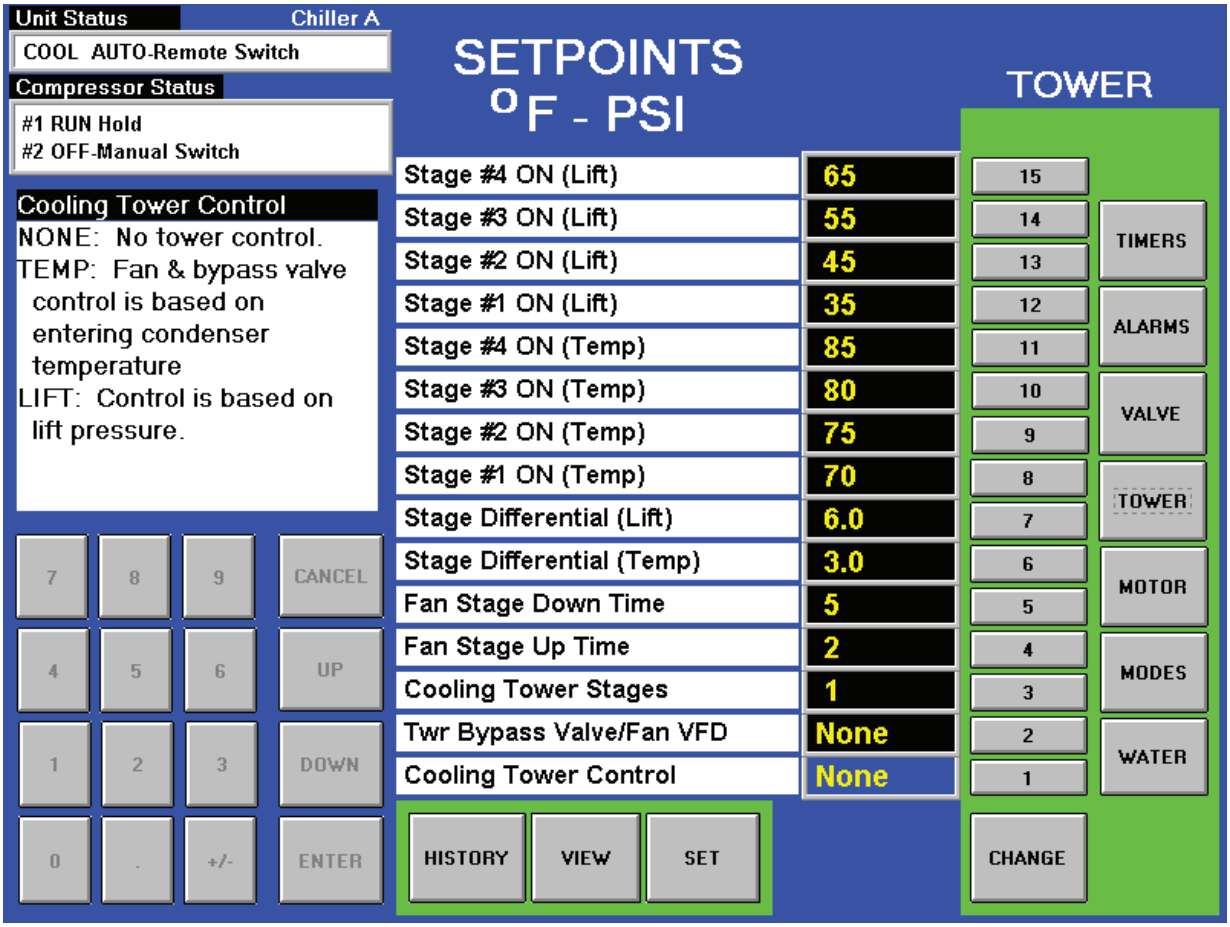


Table 8: Tower Fan Setpoint Settings (See page 32 for complete explanation.)

Description	No.	Default	Range	Password	Comments
Stage #4 On (Lift)	15	65 psi	10 to 130 psi	M	Lift pressure for fan stage #4 on
Stage #3 On (Lift)	14	55 psi	10 to 130 psi	M	Lift pressure for fan stage #3 on
Stage #2 On (Lift)	13	45 psi	10 to 130 psi	M	Lift pressure for fan stage #2 on
Stage #1 On (Lift)	12	35 psi	10 to 130 psi	M	Lift pressure for fan stage #1 on
Stage #4 On (Temp)	11	85 °F	40 to 120 °F	M	Temperature for fan stage #4 on
Stage #3 On (Temp)	10	80 °F	40 to 120 °F	M	Temperature for fan stage #3 on
Stage #2 On (Temp)	9	75 °F	40 to 120 °F	M	Temperature for fan stage #2 on
Stage #1 On (Temp)	8	70 °F	40 to 120 °F	M	Temperature for fan stage #1 on
Stage Differential (Lift)	7	6.0 psi	1.0 to 20.0 psi	M	Fan staging deadband with Setpoint # 1=Lift
Stage Differential (Temp)	6	3.0 °F	1.0 to 10.0 °F	M	Fan staging deadband with Setpoint #1=Temp
Fan Stage Down Time	5	5 min	1 to 60 min	M	Time delay between stage up/down event and next stage down
Fan Stage Up Time	4	2 min	1 to 60 min	M	Time delay between stage up/down event and next stage up
Cooling Tower Stages	3	2	1 to 4	M	Number of fan stages used
Twr Bypass Valve/Fan VFD	2	None	None, Valve Setpoint, Valve Stage, VFD Stage, Valve SP/VFD Stage	M	None: No tower valve or VFD Valve Setpoint: Valve controls to VALVE SP2(4) & 3(5) Valve Stage: Valve control setpoint changes to fan stage setpoint VFD Stage: 1st fan is VFD controlled, no valve Valve Setpoint/VFD Stage: Both valve and VFD
Cooling Tower Control	1	None	None, Temperature, Lift	M	None: No tower fan control Temperature: Fan and valve controlled by EWT Lift: Fan and valve controlled by lift pressure

Explanation of Tower Control Settings

There are five possible tower control strategies: (I) **NONE**, (II) **VALVE SP**, (III) **VALVE STAGE**, (IV) **VFD STAGE**, and (V) **VALVE SP / VFD STAGE**. These control strategies are selected from the TOWER Setpoint Screen (see Figure 31 on page 31) using Setpoint 2. (In the following pages, “SP” means “Setpoint.”) An explanation of each control strategy follows this paragraph. Along with each explanation is a diagram and graph to help illustrate the control strategy. Note that these graphs illustrate the default conditions for each strategy. See "Setting Tower Control Using the OITS Panel" on page 34 for details on how to set these tower control strategies.

(I) **NONE:** This control strategy is tower fan staging only. This is not a recommended strategy. In this mode the tower fan staging (up to four stages) is controlled by either the condenser Entering Water Temperature (EWT) or LIFT pressure (difference between the condenser and evaporator pressure). Tower bypass or fan speed are not controlled. See Figure 32 and Figure 33.

Figure 32: TOWER Setpoint - SP2 - (I) NONE

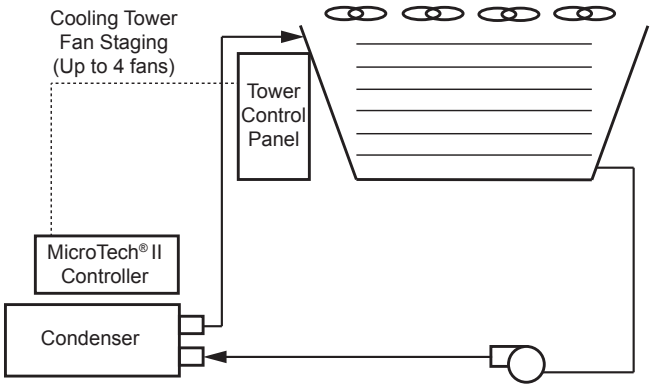
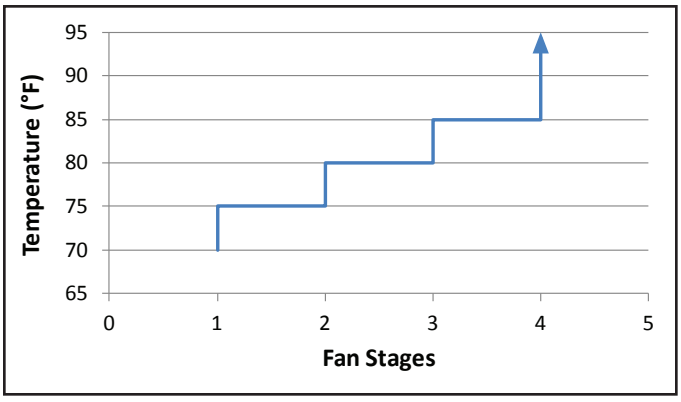


Figure 33: (I) NONE - Temperature vs. Fan Stages



(II) **VALVE SP:** This control strategy is tower staging (up to four stages) with a low-limit controlled bypass valve. The tower fans are controlled as in (I), plus a tower bypass valve is controlled to provide a minimum condenser EWT. There is no interconnection between the fan control and the valve control. See Figure 34 and Figure 35.

Figure 34: TOWER Setpoint - SP2 - (II) VALVE SP

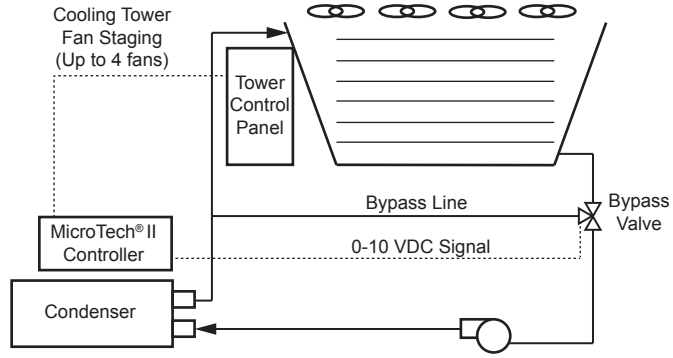
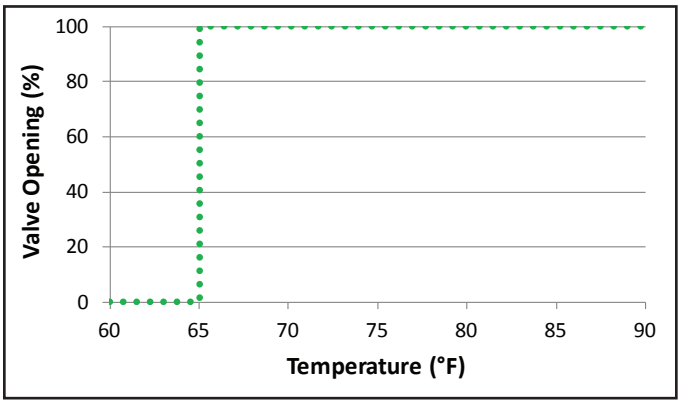


Figure 35: (II) VALVE SP - Valve Opening vs. Temperature



As shown in Figure 35, the default temperature at which the valve opens completely is 65°F. This temperature is the Valve SP and is adjustable.

(III) **VALVE STAGE:** This control strategy is tower staging (up to four stages) with a stage-controlled bypass valve. In this mode, the bypass valve controls between fan stages to smooth the control and reduce fan cycling. See Figure 34 and Figure 37.

Figure 36: TOWER Setpoint - SP2 - (III) VALVE STAGE

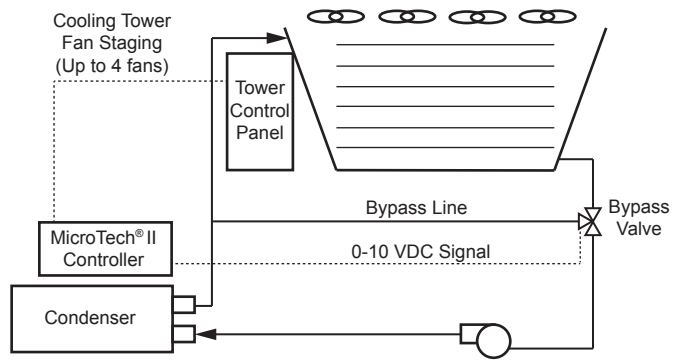
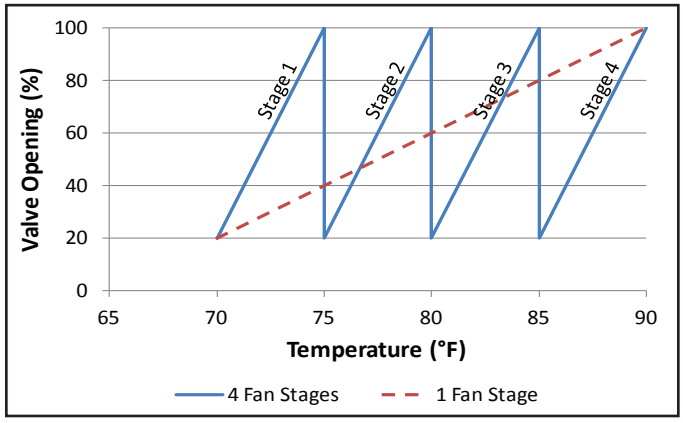


Figure 37: (III) VALVE STAGE - Valve Opening vs. Temperature



As shown in Figure 37, the default minimum and maximum valve opening positions are 20% and 100%, respectively. These minimum and maximum positions are adjustable anywhere between 0% and 100%. Additional fans stage on when the valve opening position reaches the maximum value that was set.

(IV) **VFD STAGE:** In this mode, a VFD controls the first fan. Up to three more fans are staged on and off and there is no bypass valve. See Figure 38 and Figure 39.

Figure 38: TOWER Setpoint - SP2 - (IV) VFD STAGE

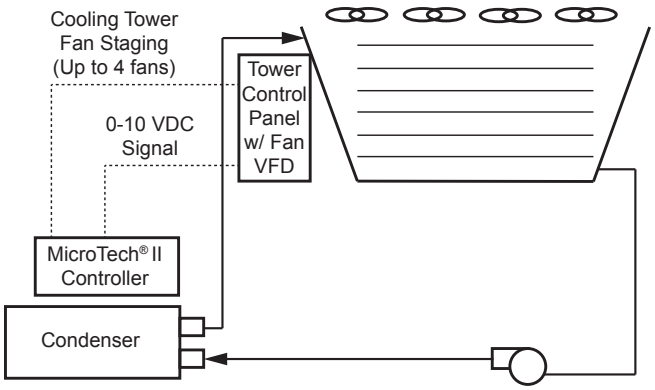
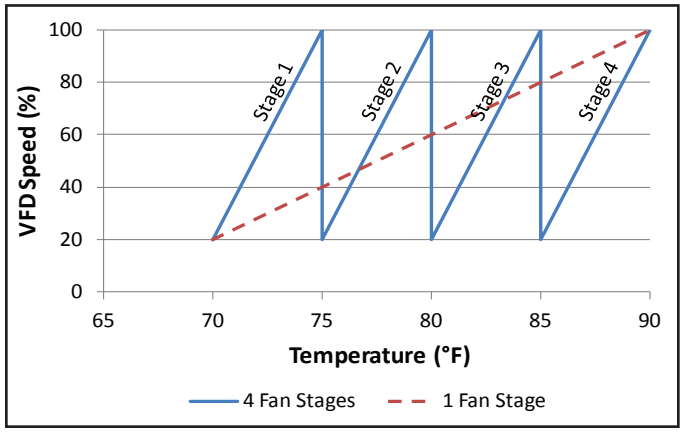


Figure 39: (IV) VFD STAGE - VFD Speed vs. Temperature



As shown in Figure 39, the default minimum and maximum VFD speeds are 20% and 100%, respectively. These minimum and maximum values are adjustable anywhere between 0% and 100%. Additional fans stage on when the VFD speed reaches the maximum value that was set.

(V) **VALVE SP / VFD STAGE:** This control strategy is tower fan control with a VFD and bypass valve control. See Figure 40 and Figure 41.

Figure 40: TOWER Setpoint - SP2 - (V) VALVE SP / VFD STAGE

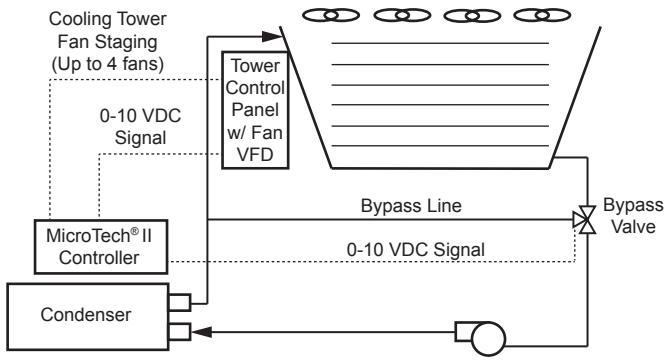
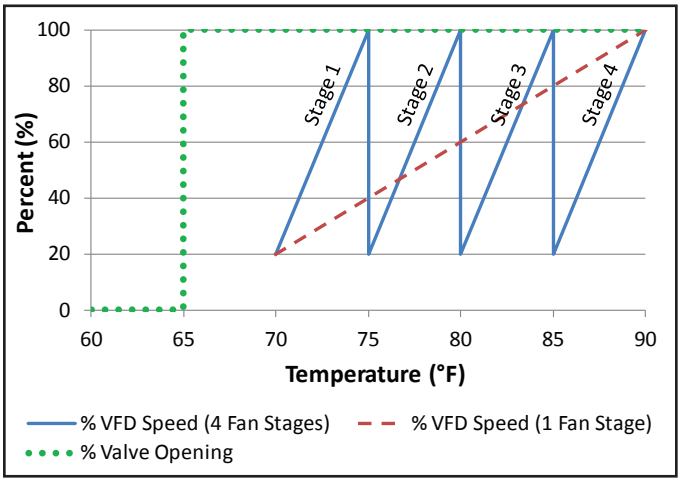


Figure 41: (V) VALVE SP / VFD STAGE Percent vs. Temperature

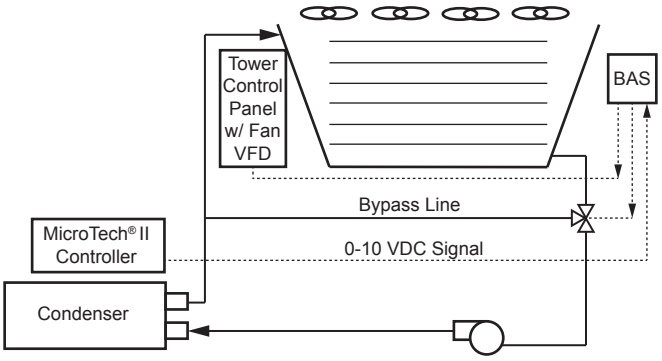


As shown in Figure 41, the default minimum and maximum VFD speeds are 20% and 100%, respectively. These minimum and maximum values are adjustable anywhere between 0% and 100%. Additional fans stage on when the VFD speed reaches the maximum value that was set. In addition, Figure 41 shows that the default temperature at which the valve opens completely is 65°F. This temperature is the Valve SP and is adjustable.

BAS Alternate

In control strategies (I) through (V), the chiller MicroTech® II is directly controlling the cooling tower fan staging, variable frequency drives, and bypass valves. As an alternative, a BAS can control these components based on a signal from the MicroTech® II controller. See Figure 42.

Figure 42: BAS Alternate



Setting Tower Control Using the OITS Panel

MicroTech® II may assist in the head control either directly or through inputs to a BAS to optimize performance and efficiency. Using the MicroTech® II, up to four Digital Outputs of Tower Staging along with three Analog Outputs (0-10 VDC) are available. The three Analog Outputs are as follows:

1. Bypass Valve signal
2. Tower Fan VFD signal
3. Tower Reset signal: Defined by a voltage to offset the tower control setting. If the MicroTech® II is controlling the tower, this signal is not used.

Setup for any tower control will be accomplished on the OITS using the TOWER Setpoint Screen (see Figure 31 on page 31) and the VALVE Setpoint Screen (see Figure 30 on page 30).

Setpoint 1 (Cooling Tower Control) on the TOWER Setpoint Screen sets the type of control. NONE is selected as default. Choose TEMP for entering condenser water control or LIFT to define the lift pressure between the Evaporator Pressure and the Condenser Pressure.

Setpoint 3 (Cooling Tower Stages) on the TOWER Setpoint Screen sets the number of tower stages that the tower has.

Setpoint 2 (Tower Bypass Valve / Fan VFD) on the TOWER Setpoint Screen defines if and how the first two MicroTech® II Analog Outputs (Bypass Valve signal and Tower Fan VFD signal) will be used with the Staging selected for the tower. A BAS or other control may monitor these outputs to understand when or how much the MicroTech® II would recommend for proper head control on the WMC unit. The third Analog Output (Tower Reset) is only configurable from the MicroTech® II controller. Commissioning setup of this 0-10 VDC signal, that will represent the MicroTech® II recommending increased head pressure by a reset voltage, is typically done by the McQuay International startup technician. Setup instructions for each of the five tower control strategies are provided next.

(I) NONE: Tower Fan Staging Only (This is the default setting but it is NOT a recommended control strategy.)

The following settings are used for the Tower Fan Staging Only mode, (SP = setpoint)

A. TOWER Setpoint Screen

1. SP1. Select TEMP if control is based on condenser EWT or LIFT if based on compressor lift expressed in pressure.
2. SP2. Select NONE for no bypass valve or fan VFD control.
3. SP3. Select one to four fan outputs depending on the number of fan stages to be used. More than one fan can be used per stage through the use of relays.
4. SP4. Select STAGE UP TIME from 1 to 60 minutes. The default value of 2 minutes is probably a good starting point. The value may need to be adjusted later depending on actual system operation.
5. SP5. Select STAGE DOWN TIME from 1 to 60 minutes. The default value of 5 minutes is probably a good starting point. The value may need to be adjusted later depending on actual system operation.
6. If TEMP is selected in SP1, use
   a. SP6. Select STAGE DIFFERENTIAL in degrees F. Start with default of 3°F.
   b. SP8-11. Set the STAGE ON temperatures consistent with the temperature range over which the condenser EWT is desired to operate. The default values of 70°F, 75°F, 80°F and 85°F are a good place to start in climates with moderate wet bulb temperatures. The number of STAGE ON setpoints used must be the same as SP3.
7. If LIFT is selected in SP1, use
   a. SP7. Select STAGE DIFFERENTIAL in PSI. Start with default of 6.0 PSI.
   b. SP12-15. Start with default setpoints. The number of STAGE ON setpoints used must be the same as SP3.

(II) VALVE SP: Tower Fan Staging With Bypass Valve Controlling Minimum EWT

A. TOWER Setpoint Screen

1. Use all of the same setpoint settings as those outlined in section I.A [the TOWER Setpoint Screen section for control strategy (I) NONE] except for SP2. For SP2, select VALVE SP for control of the bypass valve based on temperature or lift.

B. VALVE Setpoint Screen

1. SP1. Select NC or NO depending if valve is *normally closed* to the tower with no control power or *normally open* to the tower with no control power.
2. If TEMP was selected for SP1 on the TOWER

Setpoint Screen, use the following on the VALVE Setpoint Screen:

a. SP2. Set the VALVE TARGET. This setpoint is usually 5°F below the minimum fan stage setpoint established in SP8 of the TOWER Setpoint Screen. This keeps full flow through the tower until the last fan is staged off. The default for SP2 is 65°F.

b. SP4. Set VALVE DEADBAND. The default of 1.0°F is a good place to start.

c. SP12. Set the minimum position to which the valve can go. The default is 10%.

d. SP13. Set the maximum position to which the valve can go. The default is 100%.

e. SP14. Set the control gain for error. The default is 20.

f. SP15. Set the control gain for slope. The default is 1.

⚠ CAUTION

Setpoints 14 and 15 on the VALVE Setpoint Screen are site specific, dealing with system fluid mass, component size, and other factors affecting the reaction of the system to control inputs. To avoid possible equipment damage, these setpoints should be set by personnel experienced with setting up this type of control.

3. If LIFT was selected for fan control, use:

a. SP3. Set the VALVE TARGET. This setpoint is usually 5 psi below the minimum fan stage setpoint established in SP12 of the TOWER Setpoint Screen. This keeps full flow through the tower until the last fan is staged off. The default for SP3 is 30 psi.

b. SP5. Set VALVE DEADBAND, the default of 1.0 psi is a recommended initial setting.

c. SP12. Set the minimum position to which the valve can go. The default is 10%.

d. SP13. Set the maximum position to which the valve can go. The default is 100%.

e. SP14. Set the control gain for error. The default is 20.

f. SP15. Set the control gain for slope. The default is 1.

⚠ CAUTION

Setpoints 14 and 15 on the VALVE Setpoint Screen are site specific, dealing with system fluid mass, component size, and other factors affecting the reaction of the system to control inputs. To avoid possible equipment damage, these setpoints should be set by personnel experienced with setting up this type of control.

(III) VALVE STAGE: Tower staging with bypass valve controlled by fan stage

A. TOWER Setpoint Screen

1. Use all of the same setpoint settings as those outlined in section I.A [the TOWER Setpoint Screen section for control strategy (I) NONE] except for SP2. For SP2, select VALVE STAGE. .

B. VALVE Setpoint Screen

1. Use all of the same setpoint settings as those outlined in section II.B [the VALVE Setpoint Screen section for control strategy (II) VALVE SP]. In addition, set the following:

a. SP6. Set STAGE UP (valve position % open) above which the first fan can stage on. Fan STAGE#X ON temperature from SP8-11 on the TOWER Setpoint Screen and FAN STAGE UP TIME from SP4 on the TOWER Setpoint Screen must also be satisfied. The default for SP6 is 80%.

b. SP7. Set STAGE DOWN (valve position % closed) below which the first fan can stage off. Fan STAGE#X ON temperature form SP8-11 on the TOWER Setpoint Screen and FAN STAGE DOWN TIME from SP5 on the TOWER Setpoint Screen must also be satisfied). The default for SP7 is 20%.

(IV) VFD STAGE: Fan VFD, no bypass valve

A. TOWER Setpoint Screen

1. Use all of the same setpoint settings as those outlined in section I.A [the TOWER Setpoint Screen section for control strategy (I) NONE] except for SP2. For SP2, select VFD STAGE for control of the VFD speed based on temperature or lift.

(V) VALVE SP/VFD STAGE: Fan VFD, no bypass valve

A. TOWER Setpoint Screen

1. Use all of the same setpoint settings as those outlined in section I.A [the TOWER Setpoint Screen section for control strategy (I) NONE] except for SP2. For SP2, select VALVE SP/VFD STAGE.

B. VALVE Setpoint Screen

1. Use all of the same setpoint settings as those outlined in section II.B [the VALVE Setpoint Screen section for control strategy (II) VALVE SP].

MOTOR Setpoint Screen

Figure 43: MOTOR Setpoint Screen

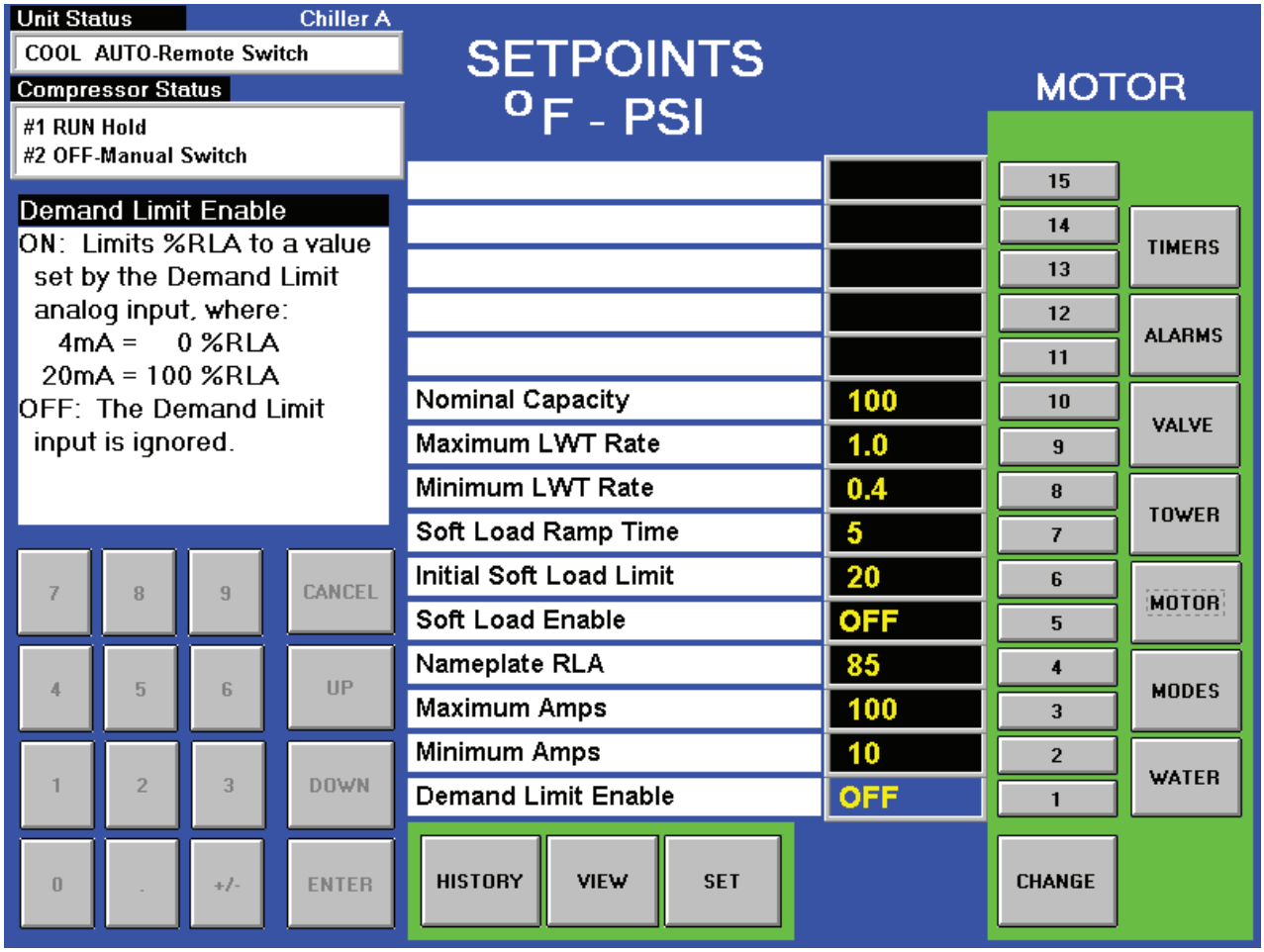


Table 9: MOTOR Setpoint Settings

Description	No.	Default	Range	Password	Comments
Nominal Capacity	10	100	0 to 9999 Tons	T	Determines when to shut off a compressor. ONLY applies to multi-chiller setup.
Maximum LWT Rate	9	0.5 °F/min	0.1 to 5.0 °F/min	M	Inhibits loading if LWT change exceeds the setpoint value
Minimum LWT Rate	8	0.1 °F/min	0.1 to 5.0 °F/min	M	Additional compressor can start if LWT change is below setpoint
Soft Load Ramp Time	7	5 min	1 to 60 min	M	Time period to go from initial load point (% RLA) set in SP 5 to 100% RLA
Initial Soft Load Limit	6	40%	10 to 100%	M	Initial amps as % of RLA, Uses SP4 & 6
Soft Load Enable	5	OFF	OFF, ON	M	Soft load on or off, Uses SP6 & 7
Nameplate RLA *	4	Dependent on dataplate		T	RLA value from compressor nameplate
Maximum Amps	3	100%	10 to 100%	T	% RLA above which loading is inhibited (Load Limit) SP + 5% unloads compressor
Minimum Amps	2	40%	5 to 80%	T	% RLA below which unloading is inhibited
Demand Limit Enable	1	OFF	OFF, ON	O	ON sets %RLA at 0% for 4 mA external signal and at 100% RLA for 20 mA signal OFF – signal is ignored

NOTE: Setpoints that have a technician level password (T) should only be changed by a McQuay International technician. Contact a McQuay International service representative for more information.

⚠ CAUTION

* Chiller Nameplate RLA **MUST** match chiller dataplate per compressor.

Compressor Capacity Control

Compressor capacity is determined by the status of the leaving chilled water temperature (LWT), which is a direct indicator of whether the chiller is producing enough cooling to satisfy the cooling load. The LWT is compared to the active chilled water setpoint, and compressor loading or unloading ensues, considering any capacity overrides that may be in effect.

Capacity Overrides

The conditions described in the following subparagraphs override normal capacity control when the chiller is in the COOL mode. Of the following limits, the one creating the lowest amp limit is in effect. The resulting present limit value for compressor current is stored in the Active Demand Limit variable.

Low Evaporator Pressure

If the evaporator pressure drops below the Low Evaporator Pressure – Inhibit setpoint, the unit will inhibit capacity increases. If the evaporator pressure drops below the Low Evaporator Pressure - Unload setpoint, the unit will begin capacity decreases.

High Discharge Temperature - Load

If the discharge temperature rises above the High Discharge Temperature - Load setpoint and the Suction SuperHeat is < 15.0 °F, the unit will begin capacity increases.

Soft Load

Soft Loading is a configurable function used at compressor startup to limit the maximum current draw on the compressor in a ramp-up type manner. It is only active on the first compressor to start. The setpoints that control this function are:

- Soft Load – (ON/OFF)
- Begin Amp Limit – (%RLA)
- Maximum Amps – (%RLA)
- Soft Load Ramp – (seconds)

The active soft load limit value (in % RLA) increases linearly from the Begin Amp Limit setpoint to the Maximum Amps setpoint over the amount of time specified by the Soft Load Ramp setpoint. If the amp draw rises above the currently active soft load limit value, the unit will inhibit capacity increases. If the amp draw rises to 3% or more above this value, the unit will begin capacity decreases.

Maximum LWT Rate

The maximum rate at which the leaving water temperature can drop (chiller mode = COOL) is limited at all times by the Maximum Rate setpoint. If the rate exceeds this setpoint, capacity increases are inhibited.

Demand Limit

The maximum amp draw of the compressor can be limited by a 4 to 20 mA signal on the Demand Limit analog input. This function is only enabled if the Demand Limit setpoint is set to ON. The amp limit decreases linearly from the Maximum Amp Limit setpoint (at 4 mA) to the Minimum Amp Limit setpoint (at 20mA). If the amp draw rises above the limit value, the unit will inhibit capacity increases. If the amp draw rises to 3% or more above this value, the unit will begin capacity decreases.

Network Limit

The maximum amp draw of the compressor can be limited by a value sent through a BAS network connection and stored in the Network Limit variable. If the amp draw rises above the limit value, the unit will inhibit capacity increases. If the amp draw rises to 3% or more above this value, the unit will begin capacity decreases.

Minimum Amp Limit

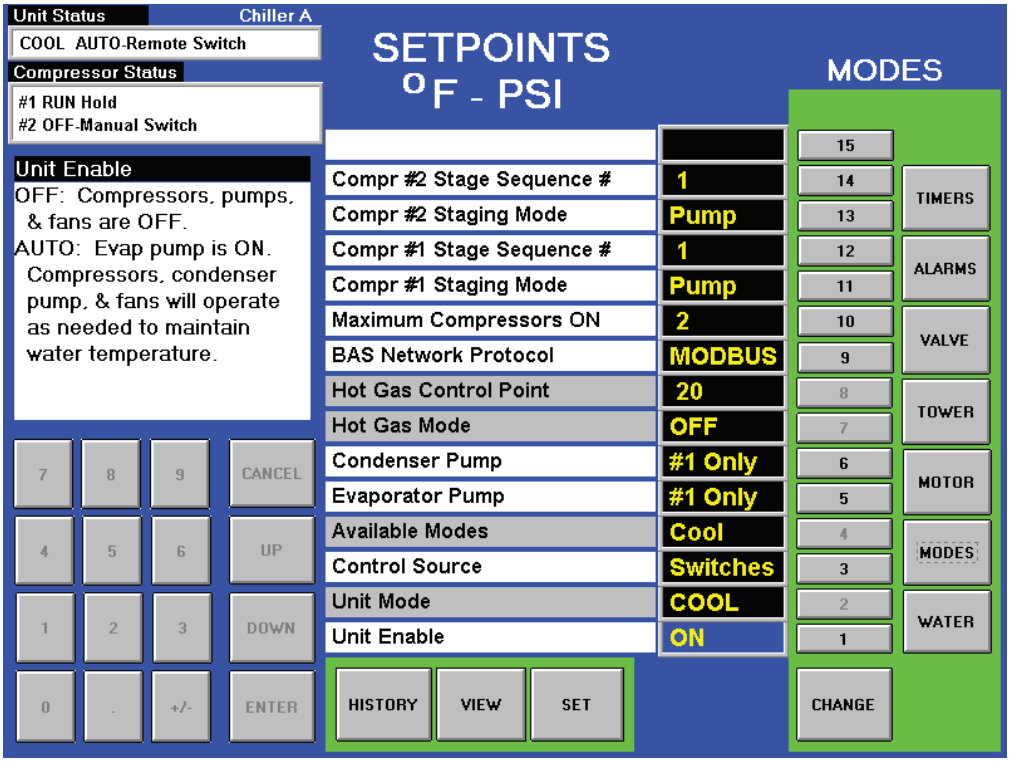
The minimum amp draw of the compressor can be limited by the Minimum Amps setpoint. If the amp draw drops below the limit value, the unit will load capacity to maintain minimum amps.

Maximum Amp Limit

The maximum amp draw of the compressor is always limited by the Maximum Amps setpoint. This limit has priority over all other functions including manual capacity control. If the amp draw rises above the limit value, the unit will inhibit capacity increases. If the amp draw rises to > 3% or more above this value, the unit will begin capacity decreases.

MODES Setpoints

Figure 44: MODES Setpoint Screen



NOTE: Grayed out setpoints do not apply to this model chiller.

Table 10: MODES Setpoint Settings

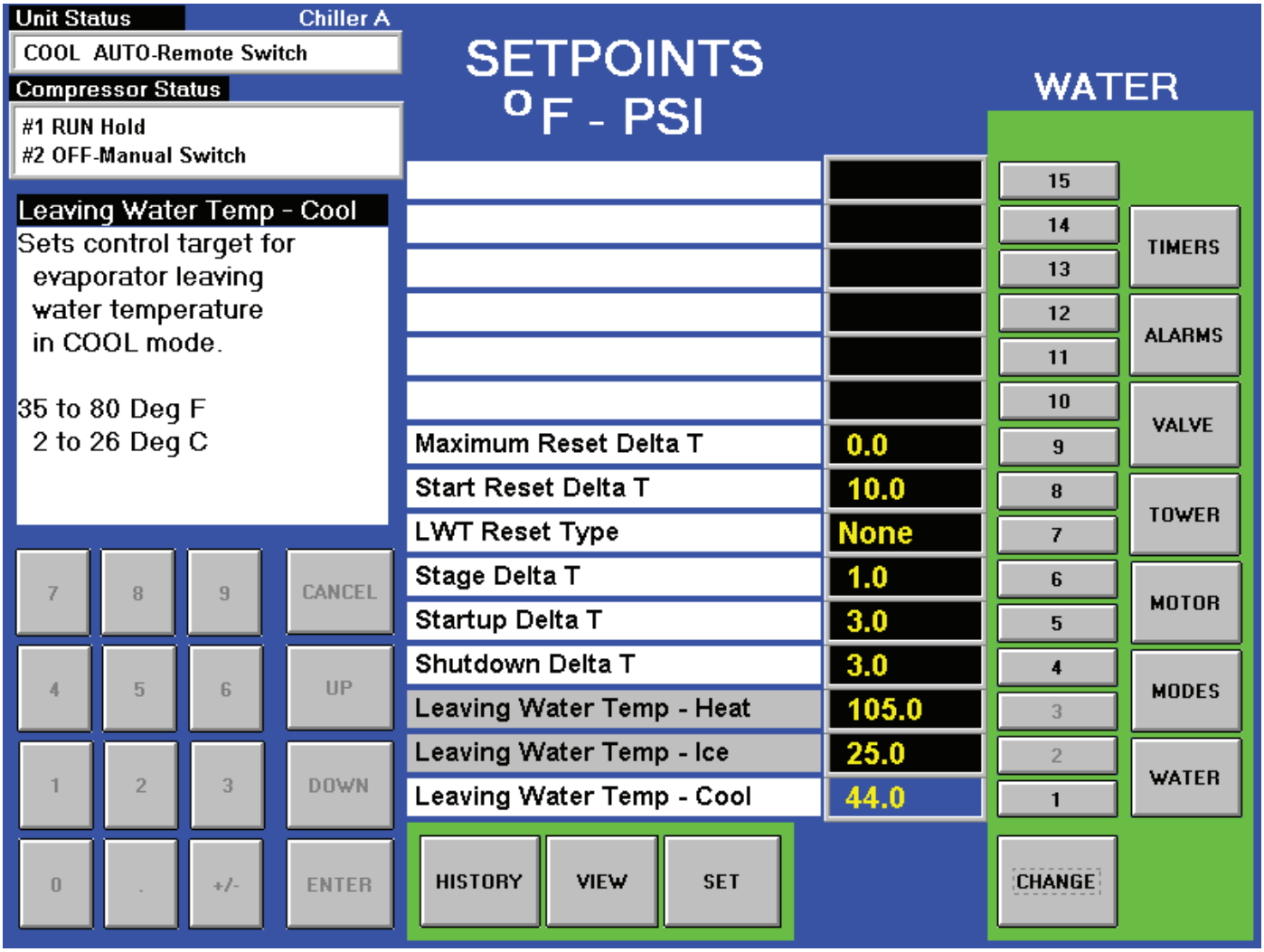
Description	No.	Default	Range	Password	Comments
Compr # 2 Stage Sequence #	14	1	1,2, … (# of Compressors)	M	Sets sequence number for # 2 compressor. If set to 1, it is always first to start. If set to 2, it is always second to start. (Note 1)
Compr # 2 Staging Mode	13	Normal	Normal, Efficiency, Pump, Standby	M	Normal uses standard sequencing, Efficiency starts one compressor on each unit, Pump starts all compressors on one chiller first, Standby uses this compressor only if another fails
Compr #1 Stage Sequence #	12	1	1,2, … (# of Compressors)	M	Sets sequence number for # 1 compressor. If set to 1, it is always first to start. If set to 2, it is always second to start. (Note 1)
Compr #1 Staging Mode	11	Normal	Normal, Efficiency, Pump, Standby	M	Normal uses standard sequencing, Efficiency starts one compressor on each unit, Pump starts all compressors on one chiller first, Standby uses this compressor only if another fails
Maximum Compressors ON	10	1	1-8	M	Total number of compressors allowed to run at one time
BAS Network Protocol	9	MODBUS	None, Local, BACnet, LonWorks, MODBUS, Remote	M	Sets BAS Standard Protocol to be used, or LOCAL if none
Condenser Pump	6	Pump #1 Only	Pump #1 Only, Pump #2 Only, Auto Lead, #1 Primary, #2 Primary	M	Pump #1 Only, Pump #2 Only, use only these pumps AUTO, balance hours between #1 and #2 #1 Primary, #2 Primary, if primary fails, use other
Evaporator Pump	5	Pump #1 Only	Pump #1 Only, Pump #2 Only, Auto Lead, #1 Primary, #2 Primary	M	Pump #1 Only, Pump #2 Only, use only these pumps AUTO, balance hours between #1 and #2 #1 Primary, #2 Primary, if primary fails, use other
Control Source	3	Switches	Switches, Local, BAS	O	Sets control source. See "Unit Enabling/Disabling" on page 20.
Unit Enable	1	OFF	OFF, AUTO	O	OFF, everything is off. AUTO, Evap pump on, comp, cond pump and tower on as required to meet LWT

NOTES:

1. If both compressors have the same sequence number, they will automatically balance starts and run-hours.
2. Setpoints 11 through 14 display compressor staging strategy.

WATER Setpoints

Figure 45: WATER Setpoint Screen



NOTE: Grayed out setpoints do not apply to this model chiller.

Table 11: WATER Setpoint Settings

Description	No.	Default	Range	Password	Comments
Maximum Reset Delta T	9	0.0°F	0.0 to 20.0 °F	M	Set the maximum reset that can occur, in degrees F if LWT reset is selected or max reset at 20 mA input if 4-20 mA is selected in SP7
Start Reset Delta T	8	10.0°F	0.0 to 20.0 °F	M	Sets the evap delta-T above which Return reset begins
LWT Reset Type	7	NONE	NONE, RETURN, 4-20mA	M	Select reset type, NONE for none, RETURN for resetting chilled water based on the entering water, or 4-20 mA for external analog signal
Stage Delta T	6	1.0	0.5 to 5°F	M	Sets the temperature the leaving water must be above setpoint for next compressor to start
Startup Delta T	5	3.0°F	0.0 to 10.0 °F	M	Degrees above setpoint for chiller to start
Shutdown Delta T	4	3.0°F	0.0 to 3.0 °F	M	Degrees below setpoint for chiller to stop
Leaving Water Temp - Cool	1	44.0°F	40.0 to 80.0 °F	M	Evaporator LWT setpoint in COOL mode

Leaving Water Temperature (LWT) Reset

The Active Leaving Water variable shall be set to the current Leaving Water Temperature (LWT) setpoint unless modified by one of the reset methods below. (The current LWT setpoint is Cool LWT as determined by the chiller mode.) The type of reset in effect is determined by the LWT Reset Type setpoint (Setpoint 7 of the WATER Setpoint Screen).

Reset Type – NONE

The Active Leaving Water variable is set equal to the current LWT setpoint.

Reset Type – RETURN

The Active Leaving Water variable is adjusted by the return water temperature.

When the chiller mode = COOL, the Active Leaving Water variable is reset using the following parameters:

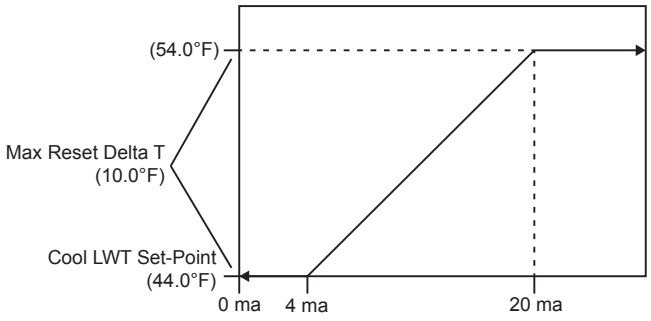
1. Cool LWT setpoint
2. Max Reset Delta T setpoint
3. Start Reset Delta T setpoint

Reset is accomplished by changing the Active Leaving Water variable from the (Cool LWT setpoint) to the (Cool LWT setpoint + Max Reset Delta T setpoint) when the evaporator (return – leaving) water temperature delta varies from the (Start Reset Delta T setpoint) to 0.

Reset Type – 4-20mA

The Active Leaving Water variable is set equal to the Cool LWT setpoint if the reset signal is less than or equal to 4 mA. It is set equal to (Cool LWT setpoint + Max Reset Delta T setpoint) if the reset signal equals or exceeds 20 mA. The Active Leaving Water variable will vary linearly between these extremes if the reset signal is between 4 mA and 20 mA. An example of this action is shown in Figure 46.

Figure 46: LWT Reset (Cool Mode)

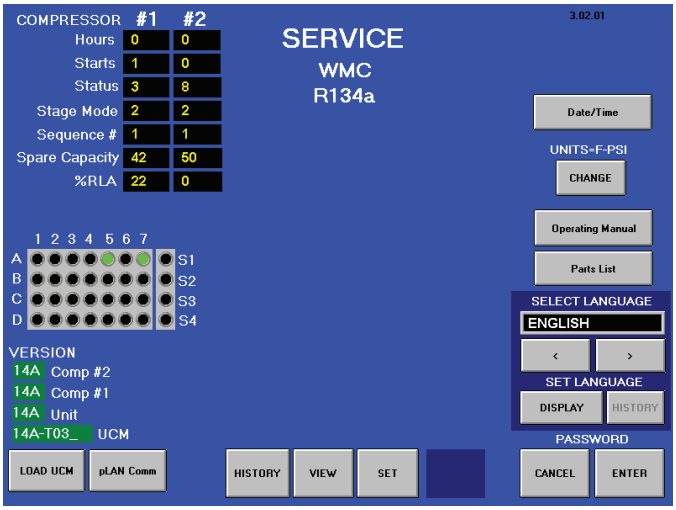


NOTE: Temperatures in Figure 46 are examples only.

Service Screen

The Service Screen (Figure 47) is accessed by pressing the SET button from any SET screen. In other words, it is the second “SET” screen. While containing information and activity buttons for the service technician, it also has valuable information for the operator.

Figure 47: Service Screen



The upper left corner of the Service Screen contains compressor information such as operating hours and number of starts for each compressor. “Spare Capacity” is used to set the compressor stopping increments.

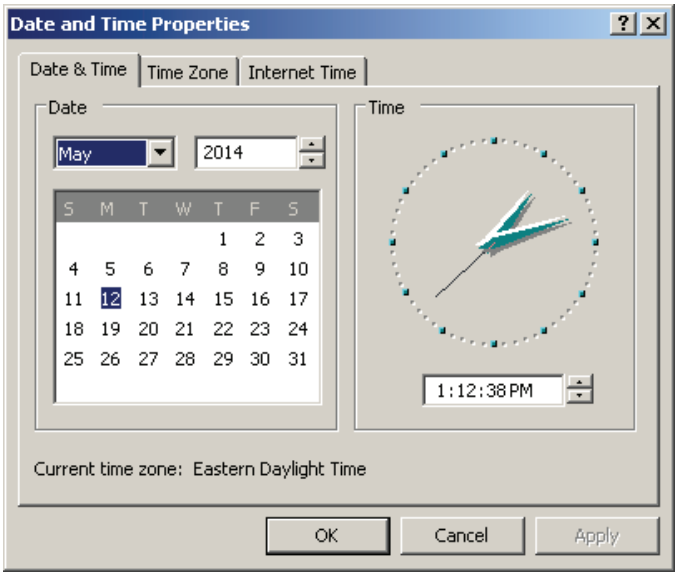
The Active pLAN Nodes matrix (middle left of the screen) shows active control components on the pLAN. A, B, C, and D are individual chillers. 1 and 2 are not used on C vintage chillers, 5 is the unit controller, and 7 is the OITS panel.

The pLAN Comm button and the LOAD UCM button (lower left of the screen) are used for setting up multiple chillers at startup by a McQuay International startup technician.

Pressing the Date/Time button on the right side of the Service Screen opens the Date and Time Properties Window, shown in Figure 48. Change the date and time on the “Date & Time” tab. To change the date, use the drop down menu to choose the correct month, use the up and down arrows to scroll to the correct year, and then select the correct day on the calendar shown. To change the time, highlight the time in the text field below the analog clock and use the up and down arrows to scroll to the correct time. Use the drop down menu in the “Time Zone” tab to change the time zone to the correct area.

NOTE: It is likely that the chiller will contain the factory settings for date, time, and time zone; therefore, it is important to verify or change these settings when the chiller is first used on the job-site. Failure to do so will result in incorrectly labeled History files.

Figure 48: Date and Time Properties Window



The CHANGE button on the Service Screen allows selection of Inch-Pounds or Metric units of measure on the OITS.

The OPERATING MANUAL button displays the manual in Adobe.

SELECT LANGUAGE allows toggling between the available languages. The language can be set separately for display or history, which is used for alarm and trend files. In order to change the language displayed on the OITS, scroll to the correct language using the left and right arrow buttons and then press the DISPLAY button. In order to change the language stored in the history files, scroll to the correct language and then press the HISTORY button. Note that the DISPLAY and HISTORY buttons must be pressed in order to make the selected language active in these respective areas.

The PASSWORD ENTER button is used to access the Keyboard Screen, see Figure 27 on page 27, to enter a password.

The version numbers shown under the pLAN Nodes matrix are the controllers' software identification. The number in the upper right corner is the OITS software identification number. These numbers may be required by Daikin Applied to answer questions about unit operation or to assist in possible future upgrades of software.

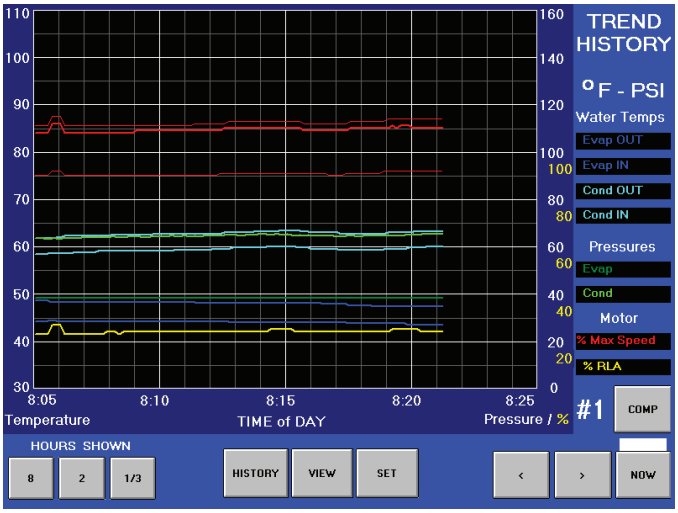
HISTORY Screens

The OITS is capable of storing two types of history: trend history and alarm history. These two types are described in the following sections.

Trend History Screen

The Trend History Screen (Figure 49) is accessed by clicking the HISTORY button at the bottom of any screen that contains this button. The HISTORY button will toggle between the Trend History Screen and the Alarm History Screen, discussed next.

Figure 49: Trend History Screen



The Trend History Screen allows the user to view the various parameters listed on the right side of the screen. The temperature scale in °F is on the left. Pressure in psi and % RLA are represented by the right-hand scale. The COMP button toggles between compressor #1 and compressor #2.

Notice that three separate red lines are displayed on the Trend History Screen. Two of those red lines will be thinner than the other. The thin red line on the bottom of all the red lines represents the minimum motor speed. The thin red line on the top of all the red lines represents the maximum motor speed. The thick red line, which should be somewhere between the minimum and maximum motor speed lines, represents the actual motor speed.

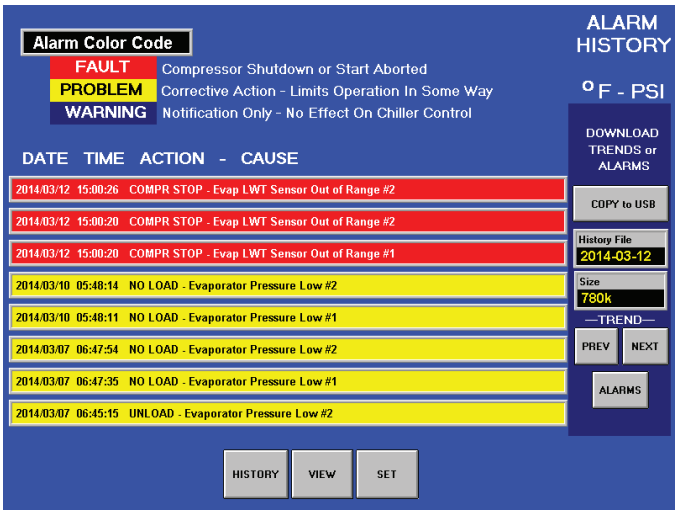
The Trend History Screen can display history for 8-hour, 2-hour, or 20-minute periods by pressing 8, 2, or 1/3, respectively. Pressing the NOW button for any time period will start the display for the current time beginning on the right of the screen with history flowing to the left. The arrow buttons scroll the time period forward or backward.

When the OITS PC is powered on after being off, the Trend History Screen will only display the history starting from the time the OITS PC was powered on. Previous trend history can be downloaded but there will be a gap in the data from when the OITS PC was off. Trend history is not affected if only the OITS screen (not the OITS PC) is off or in sleep mode. For details on how to download the trend history, reference the "Alarm History Screen" section starting on page 42.

Alarm History Screen

The Alarm History Screen (Figure 50) is accessed from the Trend History Screen by pressing the HISTORY button again.

Figure 50: Alarm History Screen

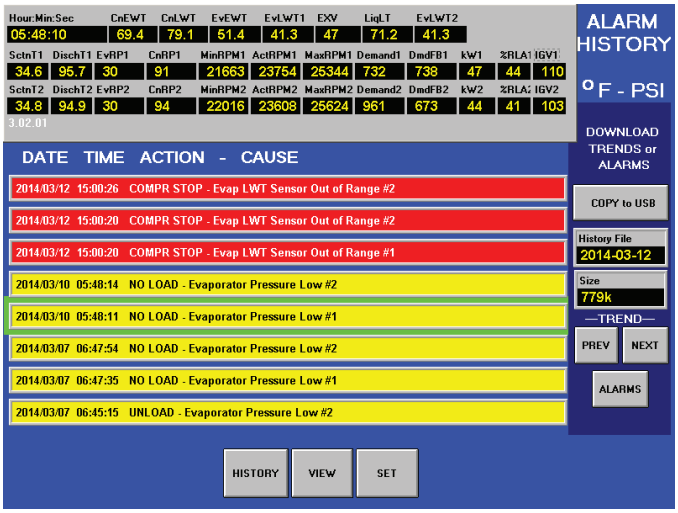

Alarm Color Code
FAULT
Compressor Shutdown or Start Aborted
PROBLEM
Corrective Action - Limits Operation In Some Way
WARNING
Notification Only - No Effect On Chiller Control
ALARM HISTORY
°F - PSI
DATE TIME ACTION - CAUSE
2014/03/12 15:00:26 COMPR STOP - Evap LWT Sensor Out of Range #2
2014/03/12 15:00:20 COMPR STOP - Evap LWT Sensor Out of Range #2
2014/03/12 15:00:20 COMPR STOP - Evap LWT Sensor Out of Range #1
2014/03/10 05:48:14 NO LOAD - Evaporator Pressure Low #2
2014/03/10 05:48:11 NO LOAD - Evaporator Pressure Low #1
2014/03/07 06:47:54 NO LOAD - Evaporator Pressure Low #2
2014/03/07 06:47:35 NO LOAD - Evaporator Pressure Low #1
2014/03/07 06:45:15 UNLOAD - Evaporator Pressure Low #2
DOWNLOAD TRENDS or ALARMS
COPY to USB
History File
2014-03-12
Size
780k
—TREND—
PREV
NEXT
ALARMS
HISTORY
VIEW
SET

There are three types of alarms:

1. **Fault (Red)**- This is an equipment protection alarm that shuts a unit or compressor off.
2. **Problem (Yellow)**- This is a limit alarm that limits compressor loading in response to an out-of-normal condition. If the condition that caused a limit alarm is corrected, the alarm light will be cleared automatically.
3. **Warning (Dark Blue)**- This is a notification only. The controller takes no action in response to this alarm.

The Alarm History Screen displays a maximum of eight alarms with the most current alarm listed on top. Each alarm displays the date stamp, action taken, and the cause of the alarm. As shown in Figure 51, clicking on a listed alarm will bring up more details about that particular alarm at the top of the screen.

Figure 51: Alarm History Screen with Alarm Detail


Hour:Min:Sec CnEWT CnLWT EvEWT EvLWT1 EXV LiqLT EvLWT2
05:48:10 69.4 79.1 51.4 41.3 47 71.2 41.3
SctnT1 DischT1 EvRP1 CnRP1 MinRPM1 ActRPM1 MaxRPM1 Demand1 DmdFB1 kW1 %RLA1 IGV1
34.6 95.7 30 91 21663 23754 25344 732 738 47 44 110
SctnT2 DischT2 EvRP2 CnRP2 MinRPM2 ActRPM2 MaxRPM2 Demand2 DmdFB2 kW2 %RLA2 IGV2
34.8 94.9 30 94 22016 23608 25624 961 673 44 41 103
3.02.01
ALARM HISTORY
°F - PSI
DATE TIME ACTION - CAUSE
2014/03/12 15:00:26 COMPR STOP - Evap LWT Sensor Out of Range #2
2014/03/12 15:00:20 COMPR STOP - Evap LWT Sensor Out of Range #2
2014/03/12 15:00:20 COMPR STOP - Evap LWT Sensor Out of Range #1
2014/03/10 05:48:14 NO LOAD - Evaporator Pressure Low #2
2014/03/10 05:48:11 NO LOAD - Evaporator Pressure Low #1
2014/03/07 06:47:54 NO LOAD - Evaporator Pressure Low #2
2014/03/07 06:47:35 NO LOAD - Evaporator Pressure Low #1
2014/03/07 06:45:15 UNLOAD - Evaporator Pressure Low #2
DOWNLOAD TRENDS or ALARMS
COPY to USB
History File
2014-03-12
Size
779k
—TREND—
PREV
NEXT
ALARMS
HISTORY
VIEW
SET

Although the Alarm History Screen only displays the eight most current alarms, a record of ALL alarms is stored in the OITS PC. Note that this record may include alarms that occurred when the chiller was in the factory. This record is maintained even if the OITS PC is powered off. When the OITS is powered back on, the last eight alarms will show back up on the Alarm History Screen and all alarm history will still be available for download. (The download process is described next.) If an alarm occurs and is cleared when the OITS PC is powered off, it will not be recorded in the alarm history.

The Alarm History Screen can be used to download the trend history (Figure 49) or the alarm history (Figure 50) via USB. In order to download the trend or alarm history, first insert a USB drive into the left side of the OITS PC (see Figure 3 on page 5 if help is needed to identify the OITS PC). The OITS PC will have two USB ports. Insert the USB drive into the USB port closer to the front of the OITS PC.

NOTE: In order to prevent viruses from being transferred from the USB drive to the OITS, it is important that a clean USB drive is used. Do NOT use a USB drive that contains any auto-executable files.

If a directory screen opens when the USB drive is inserted, close out of that screen and continue with the directions instructed below.

To Download Trend History:

- Make sure that the “History File” text field on the right side of the Alarm History Screen shows a date. If it shows “ALARMS” rather than a date, press either the PREV or NEXT button. (Pressing the PREV button when the “History File” text field shows “ALARMS” will bring up yesterday’s date. Pressing the NEXT button when the “History File” text field shows “ALARMS” will bring up today’s date.)
- Use the PREV or NEXT button to change the date in the “History File” text field to the desired date. The dates will stop scrolling when the last file in that direction has been reached. (The OITS PC will store 30 days of history at a minimum. More days might be stored depending on the trend history file sizes. The OITS PC will automatically delete old trend history files as needed to make room for new trend history files.)
- Take note of the file size of that date’s history by viewing the “Size” text field. Press the COPY to USB button and watch the file size in the “Size” text field count up to the noted file size. Once this text field has stopped counting and has reached its actual file size, the download of that file to the USB is complete.
- Repeat this process for each desired day of trend history. Each day must be downloaded individually. It is not possible to download multiple days of trend history at once.

To Download Alarm History:

- Make sure that the “History File” text field on the right side of the Alarm History Screen shows “ALARMS.” If it shows a date instead, press the ALARMS button.
- Take note of the file size of the alarm history by viewing the “Size” text field. Press the COPY to USB button and watch the file size in the “Size” text field count up to the noted file size. Once this text field has stopped counting and has reached its actual file size, the download of the alarm history to the USB is complete. (Note that unlike the trend history files, alarm history only has one file.)

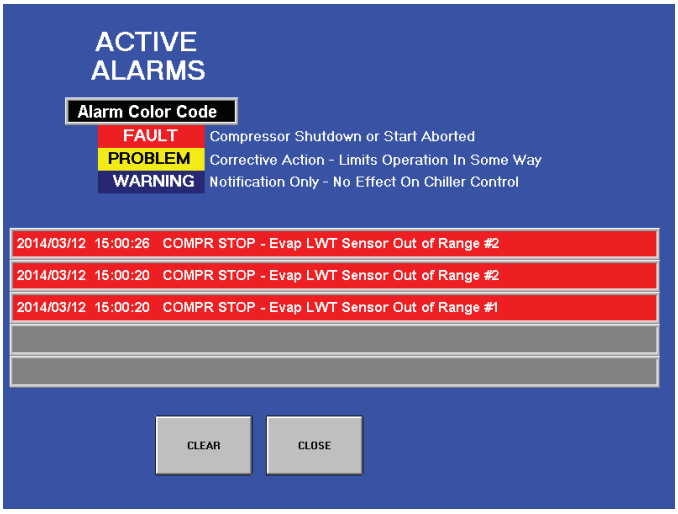
Viewing/Using Trend History and Alarm History Files:

- Trend history file names will be displayed as “HCXXXXXX”, where the first two X’s will be numbers to indicate the year, the second two X’s will be numbers to indicate the month, and the last two X’s will be numbers to indicate the day. For example, if there is a file called HC140510, it indicates that the file contains trend history from 5/10/2014.
- The alarm history file name will be displayed as “alarms.”
- All trend history and alarm history files are saved from the OITS PC as .csv files. These files can be opened on a normal PC and manipulated using Microsoft Excel for personal use. ***If tech support is requested, the original (un-manipulated) .csv files must be sent to Daikin Applied. Any other file formats are NOT accepted.***

Active Alarms Screen

The Active Alarms Screen (Figure 52) is only accessible when an active alarm exists on the unit. Pressing the red ALARM button on any screen will access the Active Alarms Screen. (In this manual, the red ALARM button is displayed as an example in Figure 16 on page 22.)

Figure 52: Active Alarms Screen


ACTIVE ALARMS
Alarm Color Code
FAULT
Compressor Shutdown or Start Aborted
PROBLEM
Corrective Action - Limits Operation In Some Way
WARNING
Notification Only - No Effect On Chiller Control
2014/03/12 15:00:26 COMPR STOP - Evap LWT Sensor Out of Range #2
2014/03/12 15:00:20 COMPR STOP - Evap LWT Sensor Out of Range #2
2014/03/12 15:00:20 COMPR STOP - Evap LWT Sensor Out of Range #1
CLEAR
CLOSE

The current active alarms (there may be more than one) will be displayed on the Active Alarms Screen. Alarms are arranged in order of occurrence, with the most recent on top. The date/time and cause of the alarm are displayed. See the "Possible Alarms and Events" section starting on page 44 for specifics on alarms that may occur.

After eliminating the cause of the alarm, clear the alarm by pressing the CLEAR button. This will clear the alarm from the register and allow the unit to restart after going through the start sequence. The alarm notice will be deleted from the screen.

If the cause of the alarm is not remedied, the alarm is still active and the alarm message will remain open. The unit will not begin its starting sequence.

Possible Alarms and Events

There are three types of alarms: faults, problems, and warnings. In addition to these three alarms, there are also "events." See the following tables for examples of faults, problems, warnings, and events that can occur. Separate tables are shown based on whether the alarm source is the unit or the compressor.

NOTE: In the "Alarm Reset" column of the following tables, itallics indicate special alarm conditions or severity. If the "Alarm Reset" says "Auto-clears," it indicates that the alarm will auto-clear after the condition is resolved and the normal condition returns.

Fault Alarms

Equipment protection faults cause rapid compressor shutdown. The compressor is stopped immediately (if the compressor was running).

Table 12: Unit Fault Alarms

Description	OITS Alarm Message	Alarm Reset
Low Motor Current Comp 1	COMPR STOP - Motor Current Low	Auto-clears
Low Motor Current Comp 2	COMPR STOP - Motor Current Low	Auto-clears
No Condenser Water Flow	COMPR STOP - Condenser Water Flow Loss	Auto-clears
No Compressor Stop Comp 1	COMPR STOP - Current High with Compr OFF	Auto-clears
No Compressor Stop Comp 2	COMPR STOP - Current High with Compr OFF	Auto-clears
No Evaporator Water Flow	COMPR STOP - Evaporator Water Flow Loss	Auto-clears
Low Evaporator Pressure Circuit 1	COMPR STOP - Evaporator Pressure Low	Auto-clears
Low Evaporator Pressure Circuit 2	COMPR STOP - Evaporator Pressure Low	Auto-clears
Leaving Evaporator Water Temperature Sensor Fault Comp 1	COMPR STOP - Evap LWT Sensor Out of Range	Auto-clears
Surge High Suct SH-Running Comp 1	COMPR STOP - Surge Temperature	Auto-clears
Surge High Suct SH-Running Comp 2	COMPR STOP - Surge Temperature	Auto-clears
Expansion Alarm – FAULT (external alarm)	COMPR STOP - Control Fault (External Input)	Auto-clears
Check Valve Fault 1	CHILLER STOP - Check Valve Failure	*Locked off (requires local reset)*
Check Valve Fault 2	CHILLER STOP - Check Valve Failure	*Locked off (requires local reset)*

Table 13: Compressor Fault Alarms

Description	OITS Alarm Message	Alarm Reset
Compressor Current Overload Trip #1	COMPR STOP - Motor Current Overload	Auto-clears
Compressor Current Overload Trip #2	COMPR STOP - Motor Current Overload	Auto-clears *Locked off if UL Limit is exceeded*
High Motor Temperature Comp 1	COMPR STOP - High Motor Temperature	Auto-clears
High Motor Temperature Comp 2	COMPR STOP - High Motor Temperature	Auto-clears *Locked off if Tripped 3x in 50 min*
Overvoltage On Compressor 1	COMPR STOP - Line Voltage High	Auto-clears
Overvoltage On Compressor 2	COMPR STOP - Line Voltage High	Auto-clears
Undervoltage On Compressor 1	COMPR STOP - Line Voltage Low	Auto-clears
Undervoltage On Compressor 2	COMPR STOP - Line Voltage Low	Auto-clears
High Condenser Pressure Circuit 1	COMPR STOP - Condenser Pressure High	Auto-clears *Locked off if Tripped 3x in 50 min*
High Condenser Pressure Circuit 2	COMPR STOP - Condenser Pressure High	Auto-clears *Locked off if Tripped 3x in 50 min*
High Discharge Temperature Circuit 1	COMPR STOP - Discharge Temperature High	Auto-clears *Locked off if Tripped 3x in 50 min*
High Discharge Temperature Circuit 2	COMPR STOP - Discharge Temperature High	Auto-clears *Locked off if Tripped 3x in 50 min*
Starter Fault Compressor 1	COMPR STOP - Compressor Fault (previously used for WMC general compressor fault)	Reset is dependent on specific alarm
Starter Fault Compressor 2	COMPR STOP - Compressor Fault (previously used for WMC general compressor fault)	Reset is dependent on specific alarm
No Starter Transition Comp 1	COMPR STOP - Compressor Comm Loss (previously used for compressor communication error)	Auto-clears
No Starter Transition Comp 2	COMPR STOP - Compressor Comm Loss (previously used for compressor communication error)	Auto-clears
General Compressor Fault 1	COMPR STOP - Compressor Fault	Reset is dependent on specific alarm
General Compressor Fault 2	COMPR STOP - Compressor Fault	Reset is dependent on specific alarm
Communication Fault 1	COMPR STOP - Compressor Comm Loss	Auto-clears
Communication Fault 2	COMPR STOP - Compressor Comm Loss	Auto-clears
Interlock Fault	NO START - Interlock Fault	Auto-clears
Interlock Fault 2	NO START - Interlock Fault	Auto-clears

Problem Alarms

Problems do not cause compressor shutdown but do limit operation of the chiller.

Table 14: Unit Problem Alarms

Description	OITS Alarm Message	Alarm Reset
Condenser Water Freeze Protect Comp 1	COND PUMP ON - Condenser Pressure Low (Freeze)	Auto-clears
Condenser Water Freeze Protect Comp 2	COND PUMP ON - Condenser Pressure Low (Freeze)	Auto-clears
Low Evaporator Pressure - Inhibit Loading Circuit 1	NO LOAD - Evaporator Pressure Low	Auto-clears
Low Evaporator Pressure - Inhibit Loading Circuit 2	NO LOAD - Evaporator Pressure Low	Auto-clears
Low Evaporator Pressure - Unload Circuit 1	UNLOAD - Evaporator Pressure Low	Auto-clears
Low Evaporator Pressure - Unload Circuit 2	UNLOAD - Evaporator Pressure Low	Auto-clears
Ground Fault Protection 1	COMPR STOP - Ground Fault	*Locked off (requires local reset)*
Ground Fault Protection 2	COMPR STOP - Ground Fault	*Locked off (requires local reset)*

Warning Alarms

Warnings only generate a warning message to the operator. Chiller operation is not affected.

Table 15: Unit Warning Alarms

Description	OITS Alarm Message	Alarm Reset
Entering Condenser Water Temperature Sensor Fault	NO ACTION - Condenser EWT Out of Range	Auto-clears
Entering Evaporator Water Temperature Sensor Fault	NO ACTION - Evaporator EWT Out of Range	Auto-clears
Liquid Line Refrigerant Temperature Sensor Fault	NO ACTION - Liquid Line Temp Out of Range	Auto-clears
Leaving Condenser Water Temperature Sensor Fault	NO ACTION - Condenser LWT Out of Range	Auto-clears
Condenser Pump #1 Fault	No Alert shown on OITS panel	No Alarm
Condenser Pump #2 Fault	No Alert shown on OITS panel	No Alarm
High Discharge Temperature Comp 1	No Alert shown on OITS panel	No Alarm
High Discharge Temperature Comp 2	No Alert shown on OITS panel	No Alarm
Entering Evap Temperature Sensor Fault (EWT reset active)	No Alert shown on OITS panel	No Alarm
Chiller Running with Limited Capacity	No Alert shown on OITS panel	No Alarm
Load Balance Valve Fault 1	COMPR WARNING - Flooded Compressor	Operator Cleared Only
Load Balance Valve Fault 2	COMPR WARNING - Flooded Compressor	Operator Cleared Only

Table 16: Compressor Warning Alarms

Description	OITS Alarm Message	Alarm Reset
Repower After Power Loss 1	COMPR STOP - Line Voltage Low	Auto-clears
Repower After Power Loss 2	COMPR STOP - Line Voltage Low	Auto-clears

Events

Events do not generate a warning message to the operator but they may notify the BAS, if used. Chiller operation may be affected by events.

Table 17: Unit Events

Description	OITS Alarm Message	Alarm Reset
High Motor Current On Compressor #1	No Alert shown on OITS panel	No Alarm
High Motor Current On Compressor #2	No Alert shown on OITS panel	No Alarm
Evaporator Freeze Protect Comp 1	EVAP PUMP ON - Evaporator Pressure Low (Freeze)	Auto-clears
Evaporator Freeze Protect Comp 2	EVAP PUMP ON - Evaporator Pressure Low (Freeze)	Auto-clears
Evaporator Pump #1 Fault	No Alert shown on OITS panel	No Alarm
Evaporator Pump #2 Fault	No Alert shown on OITS panel	No Alarm
Re-Start Fault	No Alert shown on OITS panel	No Alarm
Re-Start Fault Circuit 1	No Alert shown on OITS panel	No Alarm
Re-Start Fault Circuit 2	No Alert shown on OITS panel	No Alarm

Table 18: Compressor Events

Description	OITS Alarm Message	Alarm Reset
Bearing Fault 1	COMPR STOP - Compressor Fault	Auto-clears *Pauses 20 min after 3rd alarm in 50 min*
Bearing Fault 2	COMPR STOP - Compressor Fault	Auto-clears *Pauses 20 min after 3rd alarm in 50 min*
Motor Fault 1	COMPR STOP - Compressor Fault	Auto-clears *Pauses 20 min after 3rd alarm in 50 min*
Motor Fault 2	COMPR STOP - Compressor Fault	Auto-clears *Pauses 20 min after 3rd alarm in 50 min*
Drive Fault 1	COMPR STOP - Compressor Fault	Auto-clears
Drive Fault 2	COMPR STOP - Compressor Fault	Auto-clears
Internal Control Fault 1	COMPR STOP - Compressor Fault	Auto-clears
Internal Control Fault 2	COMPR STOP - Compressor Fault	Auto-clears

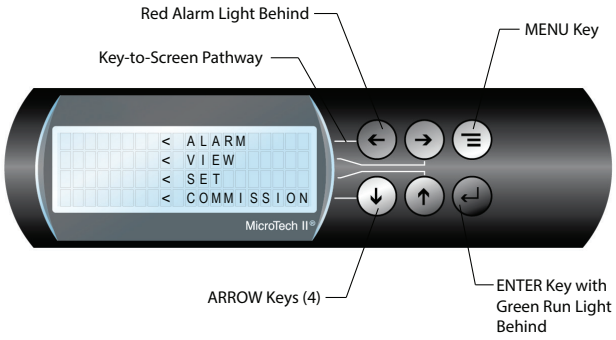
The Controller

The controller is located in the control panel (see Figure 3 on page 5) adjacent to the OITS (see Figure 1 on page 4). Unit, compressor, evaporator, and condenser information is viewable on it, and all setpoints can be accessed from it. It is encouraged to use the controller to change setpoints only when the OITS is unavailable. The controller LCD screens read only in IP units of measure (inch-pounds and degrees Fahrenheit). SI units of measure can be selected with the appropriate controller setpoint screen but will appear only on the OITS.

Keypad

A 4-line by 20-character/line liquid crystal display and 6-button keypad is mounted on the controller, as shown in Figure 53.

Figure 53: Controller Keypad



The four arrow keys (UP, DOWN, LEFT, RIGHT) have three modes of use:

1. Select a specific data screen in the menu matrix using dynamic labels such as ALARM, VIEW, SET, etc. This mode is entered by pressing the MENU key. *For ease of use, a pathway connects the appropriate button to its respective label on the screen.* See "Menu Structure (Hierarchical)" on page 48 for more information.
2. Scroll between data screens in the direction indicated by the arrows. See "Menu Structure (Scrolled)" on page 49 for more information.
3. Change field values in the setpoint programming mode. See "Editing Fields on the Controller" on page 52 for more information.

Navigating

The controller menus are arranged in a matrix of screens across a top horizontal row. Some of these top-level screens have sub-screens located under them.

There are two ways to navigate the menu matrix: Hierarchical and Scrolled.

Menu Structure (Hierarchical)

The hierarchical menu structure allows the operator to use shortcuts in order to navigate to any particular menu screen. Each menu screen can have up to four lines of information. The following steps outline screen navigation using the hierarchical method.

1. Press the MENU key to go to the top level of the hierarchy. The display will show ALARM, VIEW, and SET as shown in Figure 53. COMMISSION is normally displayed under SET and is used by McQuay International technicians at chiller startup. For more information on commissioning, contact a McQuay International service representative.
2. Once ALARM, VIEW, and SET are shown on the display, select one of these choices by pressing the key connected to it via the *pathway* shown in Figure 53. For example, use the LEFT arrow to select ALARM, the RIGHT arrow to select VIEW, and the UP arrow to select SET. Depending on the selection made at the top level, a second level of screens will appear. Second level screens along with their top level selection are shown below. The item selected is presented in bold.

Top Level Menu Selection		2nd Level Menu Screen
< **ALARM** < VIEW < SET < COMMISSION	→	ALARM < ACTIVE < LOG <
< ALARM < **VIEW** < SET < COMMISSION	→	VIEW < COMPRESSOR < UNIT < EVAPORATOR < CONDENSER
< ALARM < VIEW < **SET** < COMMISSION	→	SET < ALARM LIMITS < UNIT SPs < COMPRESSOR SPs < TOWER SPs

3. Continue choosing menu screens until the data screens are reached. Some second level selections, such as VIEW → EVAPORATOR, will go directly to a data screen from the second level screen.

2nd Level Menu Selection | Data Screen

VIEW < COMPRESSOR < UNIT < **EVAPORATOR** < CONDENSER	→ VIEW EVAPORATOR Suct SH = 000.0°F Approach = 00.0°F

Other selections, such as VIEW → UNIT, will bring up a third level of menu screens.

2nd Level Menu Selection | 3rd Level Menu Screen

VIEW < COMPRESSOR < **UNIT** < EVAPORATOR < CONDENSER	→ VIEW < STATUS UNIT < WATER < REFRIGERANT < TOWER

For instances such as this, make selections on the 3rd level menu screen in order to reach the data screens. A data screen will be apparent by the lack of the following symbol: < .

4. The first data screen that is reached will be at the top row of the data menu structure. Once a data screen is reached, the arrow keys will automatically exit out of the "key-to-screen pathway" mode and will enter the "scroll" mode. Select different data screens by using the arrow keys on the controller. See "Menu Structure (Scrolled)" for more information on navigating using the "scroll" mode.

Menu Structure (Scrolled)

As an alternate to selecting data screens with the menu function, it is possible to scroll through the screens with the four arrow keys. (Use the LEFT/RIGHT keys to move between columns and the UP/DOWN keys to move between rows.) For this use, the screens are arranged logically in a matrix as shown in Table 19 on page 50. In the "scroll" mode, there will be a blinking cursor located at the top left of the screen.

The controller holds memory during scroll navigation to make it easier to compare two screens to one another. Take the example of comparing the following two screens:

VIEW COMP (7) Hours = 00000 x10 Starts = 00000 .	VIEW COMP#2 (7) Hours = 00000 x10 Starts = 00000 .

Both of these screens are the seventh row in the "VIEW COMPRESSOR" section of the Menu Matrix (see Table 19 on page 50). The left screen is the data for Compressor 1 while the right screen is the data for Compressor 2.

In order to toggle between these two screens:

1. Use the DOWN arrow key to scroll to the "VIEW COMP (7)" screen.

VIEW COMP (7)
Hours = 00000 x10
Starts = 00000 .

2. Press the RIGHT arrow key. The controller will display the "VIEW COMP #2 (1)" screen (the screen at the top row of the next column).

VIEW COMP#2 (1)
State = Run
% RLA = 095%
Evap LWT = 054.0°F

3. Use the DOWN arrow key to scroll down to the "VIEW COMP #2 (7)" screen.

VIEW COMP#2 (7)
Hours = 00000 x10
Starts = 00000 .

4. Press the LEFT arrow key. Due to the controller memory, the controller will display the "VIEW COMP (7)" screen rather than showing the "VIEW COMP (1)" screen (the screen at the top of that column).

VIEW COMP (7)
Hours = 00000 x10
Starts = 00000 .

5. At this time, the LEFT and RIGHT arrow keys can be used to toggle back and forth between the "VIEW COMP (7)" screen and the "VIEW COMP#2 (7)" screen.

Table 19: Menu Matrix

NOTE: The notation “blank mask page” indicates that the screen does not apply to this unit.

VIEW UNIT				VIEW COMPRESSOR		VIEW EVAPORATOR
VIEW UNIT STATUS(1) UNIT= Off GasVal 2 COMP#1 Off #2Run Ev/Cn Pmps= Off /Off	VIEW UNIT WATER(1)°F In Out Delta Evap 00.0 00.0 00.0 Cond 00.0 00.0 00.0	VIEW UNIT REFRG (1) psi °F Sat Evap 000.0 000.0 Sat Cond 000.0 000.0	VIEW UNIT TOWER (1) Feedback Sig=(type?) Fans ON= 0 of 2 Setpoint= (type?)	VIEW COMP (1) State = Off % RLA = 000% Evap LWT = 054.0°F	VIEW COMP#2 (1) State = Run % RLA = 095% Evap LWT = 054.0°F	VIEW EVAPORATOR Suct SH = 000.0°F Approach = 00.0°F
VIEW UNIT STATUS(2) Comp#1 Off Start-Start Tmr Clr Inhibits None	VIEW UNIT WATER(2)°F In Out Delta HtRc 00.0 00.0 00.0 Cond 00.0 00.0 00.0	VIEW UNIT REFRG (2) Suct Line = 000.0°F Liquuid Line= 000.0°F Lift Press = 000.0psi	VIEW UNIT TOWER (2) Fan Speed = None Bypass Valve= None B-Val Sp = (type?)	VIEW COMP (2) psi Cond Press = 000.0 Evap Press = 000.0 Lift Press = 000.0	VIEW COMP#2 (2) psi Cond Press = 000.0 Evap Press = 000.0 Lift Press = 000.0	
VIEW UNIT STATUS(3) Comp#2 Run Start-Start Tmr Clr Inhibits PulDn	VIEW UNIT WATER(3)°F Water Flow Rates Evap = xxxxx GPM Cond = xxxxx GPM			VIEW COMP (3)TC Tmp BMCC PCB =XXX.xF Backplane=XXX.xF VFD Assembly=XXX.xF	VIEW COMP#2(3)TCTmp BMCC PCB =XXX.xF Backplane=XXX.xF VFD Assembly=XXX.xF”	
				VIEW COMP (4) Cavity Temp = 000.0°F Invert Temp = 000.0°C Lift Temp = +00.0°F	VIEW COMP#2 (4) °F Cavity Temp = 000.0°F Invert Temp = 000.0°C Lift Temp = +00.0°F	
				VIEW COMP (5) °F Temp SH Suction 000.0 00.0 Discharge 000.0 00.0	VIEW COMP#2 (5) °F . Temp SH Suction 000.0 00.0 Discharge 000.0 00.0 “	
				VIEW COMP (6) psi °F SatEvap 000.0 000.0 SatCond 000.0 000.0	VIEW COMP#2 (6) psi °F SatEvap 000.0 000.0 SatCond 000.0 000.0	
				VIEW COMP (7) Hours = 00000 x10 Starts = 00000 .	VIEW COMP#2 (7) Hours = 00000 x10 Starts = 00000 .	
				VIEWCOMP(8)HWLok Interlock Open Mode3 Units0 Float0 Auto Demand 000.0%	VIEWCOMP#2(8)HWLok Interlock Open Mode3 Units0 Float0 Auto Demand 000.0%	
				VIEW COMP(9)Alarms Ctl OIDSPACTRBZLGEVM Control Alarm Index X = Definition	VIEW COMP#2(9)Alarms Ctl OIDSPACTRBZLGEVM Control Alarm Index X = Definition	
				VIEW COMP(10)Motor Ctl avwekrbjodzmpgny Motor Alarm Index * X = Definition	VIEW COMP#2(10)Motor Ctl avwekrbjodzmpgny Motor Alarm Index * X = Definition	
				VIEW COMP(11)Alrms Ctl 0123456789ABCDEF Bearing Alarm Index * X = Definition	VIEW COMP#2(11)Alrms Ctl 0123456789ABCDEF Bearing Alarm Index * X = Definition	
				VIEW COMP (12) RPM Min=xxxxx Act=xxxxx Max=xxxxx Des=xxxxx LEW=xx.xF CmpFB=000%	VIEW COMP#2(12)RPM Min=xxxxx Act=xxxxx Max=xxxxx Des=xxxxx LEW=xx.xF CmpFB=000%	
				VIEW COMP(13)Temps Suct=+00.0 Cav=000.0 SCR =000.0 Ent=000.0 Disc=000.0 Lev=000.0	VIEW COMP#2(13)Temps Suct=+00.0 Cav=000.0 SCR =000.0 Ent=000.0 Disc=000.0 Lev=000.0	
				VIEW COMP(14) Pwr 3Ph=460V 60Hz 000A 24DC=24.3V KW=000.0 DC-Bus=640V IGV=25%	VIEW COMP#2(14) Pwr 3Ph=460V 60Hz 000A 24DC=24.3V KW=000.0 DC-Bus=640V IGV=25%	
				VIEWCOMP(15)Motor MaxFlow 0 Lo-Spd-Ld Cool #2 Inv=000.0°F S_SP+0000 SPdly0000S	VIEWCOMP#2(15)Motor MaxFlow 0 Lo-Spd-Ld Cool #2 Inv=000.0°F S_SP+0000 SPdly0000S	
				VIEW COMP(16) Bear FX=+xxxxA RX=+xxxxA FY=+xxxxA RY=+xxxxA AX=+xxxxA FROO=nnnnn	VIEW COMP#2(16)Bear FX=+xxxxA RX=+xxxxA FY=+xxxxA RY=+xxxxA AX=+xxxxA FROO=nnnnn	
				VIEWCOMP(17) Bear2 Comp Alarm = nnnnn Un-Balance Fr=+nnnn Ax=+nnnn Rr=+nnnn	VIEWCOMP#2(17)Bear2 Comp Alarm = nnnnn Un-Balance Fr=+nnnn Ax=+nnnn Rr=+nnnn	
				VIEWCOMP(18) BMCC BMC3.0.xxxx 01Sep13 CC 3.0.xxxx `HH:MM:SS Sr#nnnnn-nnnnn-nnnnn	VIEWCOMP#2(18) BMCC BMC3.0.xxxx 01Sep13 CC 3.0.xxxx `HH:MM:SS Sr#nnnnn-nnnnn-nnnnn	

Table 19 continued: Menu Matrix

NOTE: Screens listed in this table that have a gray background require a technician level password to manipulate.

VIEW CONDENSER	ALARM LOG	SET UNIT SETPOINTS	SET COMPRESSOR SETPOINTS		SET ALARM LIMITS	SET TOWER SETPOINTS	SET PASSWORD
VIEW CONDENSER Disch SH = 000.0°F Approach = 00.0 F Subcooling= 00.0 F	Alarm Log: 01 description HH:MM:SS MM/DD/YY	SET UNIT SPs (1) Unit Enable = Off Unit Mode = Cool Source = Switches	SET COMP SPs (1) Demand Limit=Off Minimum Amps=010% MaximumAmps=100%	SET COMP#2 SPs (1) Demand Limit=Off Minimum Amps=010% Maximum Amps=100%	SET ALARM LMTs (1) LowEvPrHold=27psi LowEvPrUnld=26psi LowEvPrStop=25psi	SET TOWER SPs (1) TowerControl=(type?) Tower Stages=1 StageUP/Dn=080/020%	SET PASSWORD Enter Password:00000 No Access Given
	Alarm Log: 02 description HH:MM:SS MM/DD/YY	SET UNIT SPs (2) Available Modes = Cool Select w/Unit Off	SET COMP SPs (2) StageMode =Normal StageSequence# = 01 Max Compr On = 02	SET COMP#2 SPs (2) StageMode =Normal StageSequence# = 01 Max Compr On = 01	SET ALARM LMTs (2) HighCondPr =140psi HiDschT-Load=170°F HiDschT-Stop=190°F”	SET TOWER SPs (2) Stage ON #1 #2 #3 #4 xxx xxx xxx xxx	SET PASSWORD (2) Tech Password 00000 00000 No Access Given
	Alarm Log: 03 description HH:MM:SS MM/DD/YY	SET UNIT SPs (3) Cool LWT = 44.0°F Ice LWT = 25.0°F Heat LWT = 135.0°F	SET COMP SPs (3) StageDeltaT = 1.0°F Stop-Start = 03 min Start-Start = 05 min	SET COMP#2 SPs (3) StageDeltaT = 1.0°F Stop-Start = 03 min Start-Start = 05 min	SET ALARM LMTs (3) WMC Compressor Oilless Design (blank mask page)	SET TOWER SPs(3)Fans VFD Min Spd = 20.0% StageDiff= (type? Psi/F) Stg Up=02 Dn=05 min	
	^ I I v	SET UNIT SPs (4) Leaving Water Temp StartDelta= 03.0°F StopDelta = 3.0°F	SET COMP SPs (4) UL Surg Ofs=200RPM Name Plate RLA 140	SET COMP#2 SPs (4) Name Plate RLA 140	SET ALARM LMTs (4) Surge Slp Str=20°F Surge Tmp Run=20°F MtrCurThrshld=05%	SET TOWER SPs (4) Valve/VFD Control= None Valve Type=NC	
	^ I I v	SET UNIT SPs (5) Rest Type = NONE MaxResetDT =00.0°F StrtResetDT = 10.0°F	SET COMP SPs (5) Lead Staging = 030% Nom Capacity=0100T HG-Bypass=30% RLA	SET COMP#2 SPs (5) Nom Capacity=0100T HG-Bypass =30%	SET ALARM LMTs (5) Evap Freeze= 34.0°F Cond Freeze= 34.0°F	SET TOWER SPs (5) Valve Sp= 065°F Reset = 20.0psi Sensor = ECWT-B3	
	^ I I v	SET UNIT SPs (6) Soft Load = OFF InitialSLAmps= 020% SoftLoadRamp=05min	SET COMP SPs (6) IntrLokTmr=010sec UnloadTimer=120sec Max Str LWT=10.0°F	SET COMP#2 SPs (6) Same as Comp #1		SET TOWER SPs (6) ValveStartPosition Min=010% @ 060°F Max=100% @ 090°F”	
	Alarm Log: 25 description HH:MM:SS MM/DD/YY	SET UNIT SPs (7) Max/Min LWT Rates Max = 1.0°F/min Min = 0.4°F/min	SET COMP SPs (7) Vane Control Lead Start = 012% Lag Start = 040%	SET COMP#2 SPs (7) WMC Automatic Vane Control (blank mask page)		SET TOWER SPs (7) Valve Control Range Min= 010% Max= 100% Tower Loop = 1.7min	
		SET UNIT SPs (8) EvapRecTmr = 0.5min EvapPump = #1 ONLY CondPump = #1 ONLY	SET COMP SPs (8) Start Speed Lead Str Spd = 015% Lag Str Spd = 003%	SET COMP#2 SPs (8) WMC Automatic VFD Control (blank mask page)		SET TOWER (8) ByP xxx% FB +075.4 Intg Derv Trg+075.0 006s 01g Gain 20 D-Band01.0	
		SET UNIT SPs (9) Templifier Src Water No Start = 070°F Delta Reset = 055°F	SET COMP SPs (9) Protocol=M-Bus MSTR Id ent Number= 001 Baud Rate = 19200	SET COMP#2 SPs (9) Starter Set Up Same as Comp #1		SET TOWER (9) VFD xxx% FB +075.4 Intg Derv Trg+075.0 600s 001s K08.0 Db0.0 Tc0500mS	
		SET UNIT SPs (10) VFD = Yes Harmonic Filter Engages > 06 RLA%	SET COMP SPs (10) Refrg Sat Pressure Evp Offset =+00.0 psi Cnd Offset =+00.0psi	SET COMP#2 SPs(10) Refrg Sat Pressure Evp Offset =+00.0 psi Cnd Offset =+00.0psi		Db Tower R06.5 F0653 CAF*+013 +012 UT250 Spd 120 000% S0200 RLA-05 CsP+002 m1000	
		SET UNIT SPs (11) Max Wtr Flow Rates Evap WF=02400GPM CondWF=03000GPM	SET COMP SPs (11) ELWT Offset = +0.0 °F Orbit Limit = A	SET COMP#2 SPs (11) Uses Comp#1 Sensor Orbit Limit = C			
		SET UNIT SPs (12) Day Lt Saving Time Day/Mon/Yr 24 hr time day of wk					
		SET UNIT SPs (13) Refrigerant=R134a Display=°F/psi(IP) Lang = English					
		SET UNIT SPs (14) Protocol = MODBUS Id #= 001 Units =IP Baud Rate = 19200					
		SET UNIT SPs (15)Exv EXV Gain=078 Md078 Offset=0700 Md0700 Prs Ctrl DOut10.0°F					

Editing Fields on the Controller

After navigating to the desired screen (notice that the blinking cursor is in the top left corner of the screen when navigating data screens), editing is accomplished by pressing the ENTER key (lower-right key on the controller) until the desired field is selected. The selected field is indicated by the blinking cursor under it. The arrow keys then operate as follows:

- DEFAULT (← Key): Set value to original factory setting.
- CANCEL (→ Key): Reset the current field to the value it had when editing began.
- INCREMENT (↑ Key): Increase the value or select the next item in a list.
- DECREMENT (↓ Key): Decrease the value or select the previous item in a list.

During “edit” mode, the display shows a two-character wide menu pane on the right of the screen (in bold font below) to help associate the correct arrow keys with their operating action.

SET COMP SPs (1)	**<D**
Demand Limit=Off	**<C**
Minimum Amps=010%	**<+**
MaximumAmps=100%	**<-**

Once the desired value has been selected using the appropriate keys, press the ENTER key to except this setting and jump to the next setting (field) in the mask.

When the last field is selected, pressing the ENTER key switches the display out of “edit” mode and returns the arrow keys to “scroll” mode, as indicated by the blinking cursor positioned in the upper left corner of the mask.

Setting Passwords

Two separate passwords provide operator and manager levels of access to changeable parameters (the technician level password is only available to McQuay International technicians):

- Operator Level Password = 100
- Manager Level Password = 2001

Either password can be entered using the SET PASSWORD screen/mask, which can be accessed in one of two ways:

1. Attempt to alter a setting without the appropriate password being active.
2. When navigating through the screens, scroll right just past the SET TOWER SPs column. (See "Table 19: Menu Matrix" on page 50.)

Either of these two methods will cause the following screen to be displayed. The gray background indicates where the blinking cursor will be. The second row will say either “Enter Operator”, “Enter Manager”, or “Enter Technician” depending on the password level required for the screen that was on the controller prior to accessing the SET PASSWORD screen.

SET PASSWORD
Enter
Password:00000
No Access Given

Once the SET PASSWORD screen is displayed, change the password using the following method (the example screens below show operator level; however, the same method is used for manager or technician level):

1. Press the ENTER key on the controller to access “edit” mode. The blinking cursor will move to the “Password” field.

SET PASSWORD	<Left
Enter Operator	<Rght
Password:00000	<+
No Access Given	<-

2. Enter the password for the required password level. Note that the password must be entered one digit at a time. Use the LEFT and RIGHT arrow keys to move horizontally across the password from one digit to the next. Use the UP and DOWN arrow keys to select the appropriate number for each digit.
3. Once the password has been entered, press the ENTER key. Notice that the blinking cursor will move to the right of the password, rather than being behind any of the digits.

SET PASSWORD	<Rtry
Enter Operator	<Exit
Password:00100	
No Access Given	<Void

4. Press the RIGHT arrow key to “Exit.” If the SET PASSWORD screen was initially accessed by attempting to alter a setting on a screen without the appropriate password active, “Exit” will cause that prior screen to be displayed. If the SET PASSWORD screen was initally accessed via scroll navigation, “Exit” will go to the VIEW UNIT STATUS (1) screen. If the ENTER key is pressed instead of pressing the RIGHT arrow key to “Exit,” the blinking cursor will go back to the top left corner of the SET PASSWORD screen, indicating that scroll navigation can continue using the arrow keys.

NOTE: Once a password has been entered, it shall remain valid for 15 minutes after the last key-press. Only the chiller with the active password is unlocked. All screens are visible, but only screens with the required access password active will allow changes to their settings.

Configuring the Control Source

In the event that the Building Automation System (BAS) – if used – or the OITS panel has become inoperative, the user can regain control of the chiller by reconfiguring the chiller control source to “Switches.” This can be accomplished with the following set of commands entered from the unit controller keypad (see "Figure 53: Controller Keypad" on page 48 for the location of various keys and key-pathways on the controller):

1. Press the MENU key.
2. Select SET using the UP arrow key.

```
< ALARM
< VIEW
< SET
< COMMISSION
```

3. From the SET menu, select UNIT SPs using the RIGHT arrow key.

```
SET < ALARM LIMITS
  <  UNIT SPs
  < COMPRESSOR SPs
  < TOWER SPs
```

4. With the SET UNIT SPs (1) screen visible, press the ENTER key. This action will engage “edit” mode and place the cursor on the “Source” selection field.

```
SET UNIT SPs (1)          <D
Unit Enable = Off         <C
Unit Mode = Cool          <+
Source = Local            <-
```

5. Press the UP or DOWN keys until the “Switches” option is visible.

```
SET UNIT SPs (1)          <D
Unit Enable = Off         <C
Unit Mode = Cool          <+
Source = Switches         <-
```

6. Press the ENTER key to activate “Switches” mode. The cursor will return to the top left of the screen and navigation through screens can resume using the “scroll” method.

```
SET UNIT SPs (1)
Unit Enable = Off
Unit Mode = Cool
Source = Switches
```

NOTE: The Unit Switch, Compressor 1 Switch, Compressor 2 Switch, External Switch, and Remote Switch – if included – must all be closed in order to enable the chiller. For more information on these switches and unit enabling, see "Unit Enabling/Disabling" on page 20.

Clearing Alarms

If the LEFT arrow key on the controller turns red, it is an indication that there is an alarm. Alarms can be cleared from the unit controller with the following commands (see "Figure 53: Controller Keypad" on page 48 for the location of various keys and key-pathways on the controller):

1. Press the MENU key.
2. Select ALARM using the LEFT arrow key.

```
  < ALARM
  < VIEW
  < SET
  < COMMISSION
```

3. From the ALARM menu, select ACTIVE using the LEFT arrow. (Selecting LOG from the ALARM menu using the RIGHT arrow will go to the Alarm Log. The controller Alarm Log holds the last 25 alarms in chronological sequence. The date, time, and alarm descriptor of each alarm is recorded.)

```
ALARM < ACTIVE
  < LOG
  <
  <
```

4. The controller will present a list of the active alarms. Use the UP and DOWN arrow keys to scroll through each active alarm. An example active alarms screen is shown below.

```
*** ALARM ACTIVE ***
     17:48    05/21
   Compressor #2
     Ground Fault
```

If no alarms are active or the bottom of the list is reached, the controller will display the following message:

```
      NO MORE ALARMS
Press ENTER to clear
Press ALARM to View
```

5. As indicated, press the ENTER key to clear the alarms. (Pressing the LEFT key will display the Alarm Log screens.) This will attempt to clear all alarms; however, it will not clear alarms that are still active. If the LEFT arrow key on the controller is still red after pressing the ENTER key, it is an indication that there are remaining issues with the chiller. Fix these issues and then re-clear the alarms until the red light no longer appears.

NOTE: The Alarm Log does not clear when the alarms are cleared. Also, alarms cleared from the controller will not be cleared from the OITS panel.

Controller Inputs and Outputs

The following tables list the controller inputs and outputs, both analog and digital.

Table 20: Controller, Analog Inputs

#	Description	Signal Source	Sensor Range
1	Reset of Leaving Water Temperature	4-20 mA Current	0 to 20°F
2	Entering Evaporator Water Temperature	NTC Thermistor (10k@25°C)	-58 to 212°F
3	Entering Condenser Water Temperature	NTC Thermistor (10k@25°C)	-58 to 212°F
4	Leaving Condenser Water Temperature	NTC Thermistor (10k@25°C)	-58 to 212°F
5	Liquid Line Refrigerant Temperature	NTC Thermistor (10k@25°C)	-58 to 212°F
6	Demand Limit	4-20 mA Current	0-100 %RLA
7	Evaporator Water Flow	4 to 20 mA Current	0 to 10,000 gpm
8	Condenser Water Flow	4 to 20 mA Current	0 to 10,000 gpm
9	Optional Tower Sump Temperature	NTC Thermistor (10k@25°C)	-58 to 212°F
10	Leaving Evaporator Water Temperature	NTC Thermistor (10k@25°C)	-58 to 212°F

NOTE: "Sensor Range" in Table 20 indicates the range of the input, NOT the operating range of the chiller.

Table 21: Controller, Digital Inputs

#	Description	Signal	Signal
1	Unit OFF Switch	0 VAC (Stop)	24 VAC (Auto)
2	Remote Off/Enable	0 VAC (Stop)	24 VAC (Enable)
3	Mode Switch	0 VAC (Normal)	24 VAC (Alternate)
4	Manual Off	0 VAC (Off)	24 VAC (Enable)
5	Manual Off2	0 VAC (Off)	24 VAC (Enable)
6	Manual Off3	0 VAC (Off)	24 VAC (Enable)
7	Manual Off4	0 VAC (Off)	24 VAC (Enable)
8	Quick Off (All Off)	0 VAC (Quick Stop)	24 VAC (Enable)
9	Ground Fault	0 VAC (Alarm)	24 VAC (Off)
10	Ground Fault2	0 VAC (Alarm)	24 VAC (Off)
12	HATS Switch	0 VAC (Off)	24 VAC (Enable)
13	External Fault	Configurable	Configurable
17	Evaporator Water Flow Switch	0 VAC (No Flow)	24 VAC (Flow)
18	Condenser Water Flow Switch	0 VAC (No Flow)	24 VAC (Flow)

Table 22: Controller, Analog Outputs

#	Description	Output Signal	Sensor Range
1	Cooling Tower Bypass Valve Position	0 to 10 VDC	0 to 100% Open
2	Cooling Tower VFD Speed	0 to 10 VDC	0 to 100%
3	EXV signal to IB Valve Control Bd.	0 to 10 VDC	0 to 100%
4	Tower Control Reset	0 to 10 VDC	0 to 100% Mask Reset
5	% Unit Load	0 to 10 VDC	0 to 125% (8V = 100%)

NOTE: "Sensor Range" in Table 22 indicates the range of the output, NOT the operating range of the chiller.

Table 23: Controller, Digital Outputs

#	Description	Load	Output OFF	Output ON
1	Evaporator Water Pump #1	Pump Contactor	Pump OFF	Pump ON
2	Evaporator Water Pump #2	Pump Contactor	Pump OFF	Pump ON
3	Condenser Water Pump #1	Pump Contactor	Pump OFF	Pump ON
4	Condenser Water Pump #2	Pump Contactor	Pump OFF	Pump ON
5	Tower Fan #1	Fan Contactor	Fan OFF	Fan ON
6	Tower Fan #2	Fan Contactor	Fan OFF	Fan ON
7	Expansion Valve Calibration	Digital Input (50K Ohms)	Normal	Calibration
8	Alarm	Alarm Indicator	Alarm OFF	Alarm ON
9	Tower Fan #3	Fan Contactor	Fan OFF	Fan ON
10	Tower Fan #4	Fan Contactor	Fan OFF	Fan ON
11	Alarm Output	User Defined	Alarm OFF	Alarm ON

Controller Setpoints

Table 24 groups setpoints that relate to the entire unit operation and are stored in the controller. Standard settings are made through the OITS. The Password (PW) column indicates the password that must be active in order to change the setpoint. The letters in the Password column refer to the following:

O = Operator (the password number for operator level is 100)

M = Manager (the password number for manager level is 2001)

T = Technician (the password number for technician level is only provided to McQuay International technicians)

Table 24: Controller Setpoints

Description	Default	Range	PW
Unit			
Unit Enable	OFF	OFF, ON	O
Control Source	SWITCHES	Switches, Local (Touch Screen), BAS Network	O
Display Units	°F/psi	°F/psi, °C/kPa	O
Language	ENGLISH	ENGLISH, (TBD)	O
BAS Protocol	Modbus	NONE, BACnet, LonWorks, Modbus	M
Motor Amps			
Demand Limit	OFF	OFF, ON	M
Minimum Amps	3%	1 to 80%	M
Maximum Amps	100%	10 to 100%	M
Soft Load	OFF	OFF, ON	M
Begin Amp Limit	20%	10 to 100%	M
Soft Load Ramp	5 min	1 to 60 min	M
Maximum Rate	1.0 °F/min	0.1 to 5.0 °F/min	M
Minimum Rate	0.4 °F/min	0.1 to 5.0 °F/min	M
Staging			
Mode	Pump	Normal, Efficiency, Pump, Standby	M
Sequence #	1	1,2, … (# of Compressors)	M
Maximum Compressors ON	2	1-16	M
Stage Delta T	1.0 °F	0 to 9.9 °F	M
Nominal Capacity	100 Tons	0 to 2000 Tons	T

NOTE: Table 24 continues onto the following pages.

Table 24 continued: Controller Setpoints

Description	Default	Range	PW
Leaving Water			
Cool LWT	44. 0°F	35.0 to 80.0 °F	O
Startup Delta T	3.0°F	0.0 to 10.0 °F	T
Stop Delta T	3.0°F	0.0 to 3.0 °F	T
LWT Reset Type	NONE	NONE, RETURN, 4-20mA	T
Max Reset Delta T	0.0°F	0.0 to 20.0 °F	T
Start Reset Delta T	10. 0°F	0.0 to 20.0 °F	T
Timers			
Evap Recirculate	0.5 min	0.2 min to 5 min	M
Start-Start	5 min	2 to 60 min	M
Stop-Start	3 min	1 to 20 min	M
Source No Start	70 °F	50 to 99 °F	T
Pumps			
Evap Pump	Pump #1 Only	Pump #1 Only, Pump #2 Only, Auto Lead, #1 Primary, #2 Primary	M
Cond Pump	Pump #1 Only	Pump #1 Only, Pump #2 Only, Auto Lead, #1 Primary, #2 Primary	M
Cooling Tower			
Tower Control	None	None, Temperature, Lift	T
Tower Stages	1	1 to 4	T
Stage Up Time	2 min	1 to 60 min	T
Stage Down Time	5 min	1 to 60 min	T
Stage Differential (Temp)	3.0 °F	1.0 to 10.0 °F	T
Stage Differential (Lift)	6.0 psi	1.0 to 20.0 psi	T
Stage #1 On (Temp)	70 °F	40 to 120 °F	T
Stage #2 On (Temp)	75 °F	40 to 120 °F	T
Stage #3 On (Temp)	80 °F	40 to 120 °F	T
Stage #4 On (Temp)	85 °F	40 to 120 °F	T
Stage #1 On (Lift)	35 psi	10 to 130 psi	T
Stage #2 On (Lift)	45 psi	10 to 130 psi	T
Stage #3 On (Lift)	55 psi	10 to 130 psi	T
Stage #4 On (Lift)	65 psi	10 to 130 psi	T
Cooling Tower Valve / VFD			
Valve/VFD Control	None	None, Valve Setpoint, Valve Stage, VFD Stage, Valve SP/VFD Stage	T
Valve Setpoint (Temp)	65 °F	40 to 120 °F	T
Valve Setpoint (Lift)	30 psi	10 to 130 psi	T
Valve Deadband (Temp)	1.0 °F	0.0 to 10.0 °F	T
Valve Deadband (Lift)	1.0 psi	0.0 to 20.0 psi	T
Stage Down @	20%	0 to 100%	T
Stage Up @	80%	0 to 100%	T
Valve Control Range (Min)	10%	0 to 100%	T
Valve Control Range (Max)	100%	0 to 100%	T
Valve Type	NC	Normally Closed, Normally Open (To Tower)	T
Minimum Start Position	10%	0 to 100%	T
Minimum Position @	60 °F	0 to 100 °F	T
Maximum Start Position	100%	0 to 100%	T
Maximum Position @	90 °F	0 to 100 °F	T

Table 24 continued: Controller Setpoints

Description	Default	Range	PW
Bypass Valve, Step and Wait Control			
Step	6 sec	0 to 999 sec	T
Derivative	1	0 to 99	T
Gain	20	0 to 99	T
Dead Band (D-Band)	1.0	0 to 200	T
Tower Fan, PID Control			
Integral	600 sec	0 to 999 sec	T
Derivative	1 sec	0 to 999 sec	T
Proportional Gain (K)	80	0 to 999 sec	T
Dead Band (DB)	0	0 to 9.9 UOM	T
Update Period (TC)	500 ms	0 to 9999 ms	T
Additional WMC Tower Reset			
Tower Reset (Temp)	10 psi	0 to 20.0 psi	T
Tower Reset (Lift)	5.0 °F	0 to 10.0 °F	T
Sensor Selection	ECWT-B3	ECWT-B3 (provided) or EHRT-B9 (not provided)	T
Alarms			
Evaporator Freeze	34.0 °F	-9.0 to 45.0 °F	T
Condenser Freeze	34.0 °F	-9.0 to 45.0 °F	T
Low Evap Pressure - Stop	25 psi	5 to 45 psi	T
Low Evap Pressure - Inhibit	30 psi	7 to 45 psi	T
Low Evap Pressure - Unload	29 psi	6 to 45 psi	T
High Discharge Temperature - Shutdown	190 °F	120 to 240 °F	T
High Discharge Temperature - Load	170 °F	120 to 240 °F	T
High Condenser Pressure	140 psi	120 to 270 psi	T
Motor Current Threshold	5%	1 to 20%	T
Surge High Suction SH - Start	20 °F	1 to 99 °F	T
Surge High Suction SH - Run	12°F	2 to 25 °F	T
Service			
Unload Timer	120 sec	5 to 300 sec	T
Interlock Timer	10 sec	1 to 240 sec	T

Building Automation Systems (BAS)

All MicroTech® II controllers with Open Choices™ are capable of BAS communications, providing easy integration and comprehensive monitoring, control, and two-way data exchange with open standard protocols such as LonTalk®, Modbus® or BACnet®.

McQuay International unit controllers strictly conform to the interoperability guidelines of the LonMark® Interoperability Association and BACnet® International. They have received LonMark® certification with optional LONWORKS® communication module.

Protocol Options

The following protocol options are available:

- BACnet® MS/TP
- LONWORKS®
- BACnet® IP
- Modbus® RTU
- BACnet® Ethernet

The BAS communication module can be ordered with the chiller and factory-mounted or can be field-mounted at any time after the chiller unit is installed. Connection to the chiller for all BAS protocols will be at the unit controller. An interface card, depending on the protocol being used, will have been factory installed in the unit controller if so ordered, or it can be field installed.

If an interface module was ordered, the appropriate BAS interface installation manual was shipped with the unit. If necessary, contact your local McQuay International sales office for a replacement manual or obtain one from www.DaikinApplied.com. These documents can be easily found on the website using the “Search Literature” feature.

Use with On-Site Generators

Magnitude® Model WMC chillers have their total tonnage divided between the number of compressors on the chiller. The compressor(s) are operated with variable frequency drives and if the unit has two compressors, the compressors start sequentially. These features make Magnitude® chillers especially appropriate for use in applications where they may be required to run with on-site electrical generators. This is particularly true when the generators are used for temporary power when the utility power is lost.

Generator Sizing

Gas and diesel generators are sensitive to the compressor’s locked-rotor characteristics when the chillers start up. Use the electrical data supplied with the performance output sheet, obtained from the McQuay International sales office, for generator sizing purposes. The chiller data sheet will show the RLA, which is for each compressor. Refer to Electrical Data to determine the LRA, which is based on the RLA. It is important to size the generator to handle the LRA at startup.

⚠ WARNING

Generator must be sized by an electrical engineer familiar with generator applications.

Transfer Back to Grid Power

Proper transfer from stand-by generator power back to grid power is essential to avoid compressor damage.

⚠ WARNING

Stop the chiller before transferring supply power from the generator back to the utility power grid. Transferring power while the chiller is running can cause severe compressor damage.

The necessary procedure for reconnecting power from the generator back to the utility grid is as follows:

1. Set the generator to always run five minutes longer than the unit start-to-start timer, which can be set from two to sixty minutes. The actual setting can be viewed on the OITS on the TIMERS Setpoint Screen (see Figure 28 on page 28).
2. Configure the transfer switch provided with the generator to automatically shut down the chiller before transfer is made. The automatic shut-off function can be accomplished through a BAS interface or with the “remote on/off” wiring connection shown in "Figure 13: Controller Box Wiring" on page 14.

It is not necessary to shutdown the chiller if pumps are not directly controlled by the chiller. Doing so, however, provides a more coordinated restart.

A start signal can be given anytime after the stop signal since the three-minute start-to-start timer will be in effect.

Service Programs

It is important that an air conditioning system receive adequate maintenance if the full equipment life and full system benefits are to be realized. Maintenance should be an ongoing program from the time the system is initially started. A full inspection should be made after 3 to 4 weeks of normal operation on a new installation and on a regular basis thereafter.

Daikin Applied offers a variety of maintenance services through the local McQuay International service office and can tailor these services to suit the needs of the building owner. Most popular among these services is the McQuay International Comprehensive Maintenance Contract. For further information concerning the many services available, contact your local McQuay International service office.

Chiller Maintenance

⚠ DANGER

Wait 20 minutes after disconnecting power from unit before opening any compressor access covers. The DC link capacitors store enough energy to cause electrocution.

Electrical System

Maintenance of the electrical system involves the general requirement of keeping connections clean and tight. Pump interlocks and flow switches should be checked to be sure they interrupt the control circuit when tripped.

Cleaning and Preserving

A common cause of service calls and equipment malfunction is dirt. This can be prevented with normal maintenance. The system components most subject to dirt are:

1. Strainers: Remove and clean strainers in the chilled water system and condenser water system at every inspection.
2. Condenser Tubes: Inspect the condenser tubes annually for fouling and clean if required. The standard waterboxes should be removed with care due to their weight. One method for handling standard waterboxes follows (only qualified service personnel should perform these tasks):
    - After draining water, remove all but two head bolts at roughly 10 and 2 o'clock.
    - Loosen the remaining two bolts to enable the head to be separated from the tube sheet sufficiently for a clevis pin or hook to be inserted into an open bolt hole at the top of the head.
    - Attach a hoist to the pin or hook, lift the head to remove weight from the two remaining bolts, remove the bolts, and carefully remove the head.
    - Do not try to install a machine thread eyebolt into the head vent fitting, which has pipe threads.
    - Reverse this procedure to mount the head, using a new gasket.

Water Treatment

Special care must be taken when utilizing open system water that is usually not treated (such as lakes, rivers, and ponds). The use of untreated water will result in corrosion, erosion, slime buildup, scaling, or algae formation. Water treatment service must be used. Special tube and water head material may be required to reduce damage from corrosion. Daikin Applied is not responsible for damage or faulty operation from untreated or improperly treated water.

Seasonal Shutdown

⚠ CAUTION

The condenser and evaporator are not self-draining. Where the chiller can be subject to freezing temperatures, the condenser and evaporator must be drained of all water. Water permitted to remain in the piping and vessels can rupture these parts if subjected to freezing temperatures. Dry air blown through the vessels will aid in forcing all water out.

Except for freezing conditions, it is desirable to leave water in the vessels to avoid long term exposure to air.

Continuous forced circulation of antifreeze through the vessels is one method of avoiding freeze up.

Seasonal Startup

Seasonal startup procedures are as follows:

1. Leak test the unit.
2. Check and tighten all electrical connections.
3. Replace the drain plugs (including cooling tower pump and tower drain) if they were removed at shutdown the previous season.

Maintenance Schedule

Table 25 provides an overview of recommended maintenance procedures along with how frequently these procedures should be performed.

Table 25: Recommended Maintenance Schedule

	Monthly	Quarterly	Semi-Annually	Annually	As Required By Performance	During Seasonal Shutdown	During Seasonal Startup
I. Compressor							
A. Analyze Compressor Fault Log		X					
B. Check IGV operation		X					
D. Check and tighten compressor electrical connections				X			
II. MicroTech® II Controls							
A. Check for proper settings		X					
B. Verify transducers and sensors for accuracy		X					
C. Retrieve and archive OITS Trend Logs	O						
D. Perform MicroTech® II check, log, and last fault analysis		X					
III. Condenser							
A. Confirm correct water flow and pressure drop	O	X					
B. Confirm appropriate water treatment	O						
C. Clean and Leak Test condenser tubes				X	X	X	
D. Eddy Current Test - tube wall thickness					X		
E. Seasonal Protection					X		
IV. Evaporator							
A. Confirm correct water flow and pressure drop	O	X					
B. Confirm appropriate water treatment	O						
C. Clean and Leak Test evaporator tubes					X		
D. Eddy Current Test - tube wall thickness					X		
E. Seasonal Protection					X		
V. Chiller Unit							
A. Run Test / Performance Evaluation		X					
B. Leak Test entire unit		X				X	X
C. General Appearance:							
1. Paint / Corrosion					X		
2. Insulation					X		
VII. Electrical							
A. Check and record line voltage		X					
B. Inspect power components for signs of overheating		X					
C. Check and tighten unit electrical components				X			X

Key: O = Performed by in-house personnel X = Performed by qualified service personnel

Definitions

Active Amp Limit

Active amp limit is the actual amp limit imposed by an outside signal such as the load limit function.

Active Capacity Limit

The active capacity setpoint is the setting in effect at any given moment. Any one of several external inputs can limit a compressor's capacity below its maximum value.

Active Setpoint

The active setpoint is the parameter setting in effect at any given moment. This variation can occur on setpoints that can be altered during normal operation. Resetting the chilled water leaving temperature setpoint by one of several methods such as return water temperature is an example.

Condenser Recirc (Recirculation) Timer

A timing function, with a 30-second default after start, that holds off tower fan control for the duration of the timing setting.

Dead Band

The dead band is a set of values associated with a setpoint such that a change in the variable occurring within the dead band causes no action from the controller. For example, if a temperature setpoint is 44°F and it has a dead band of ± 2.0°F, nothing will happen until the measured temperature is less than 42°F or more than 46°F.

Demand

Signal between 0 & 1000 sent from the compressor controller to the compressor. This directs where the compressor needs to be with capacity: increasing, stable, or decreasing.

Discharge Superheat

Discharge superheat is calculated using the following equation:

Discharge Superheat = Discharge Temperature – Condenser Saturated Temperature

ELWT

Evaporator leaving water temperature. The "water" is any fluid used in the chiller circuit.

ELWT Error

Error in the controller context is the difference between the value of a variable and the setpoint. For example, if the ELWT setpoint is 44°F and the actual temperature of the water at a given moment is 46°F, the ELWT error is +2 degrees.

ELWT Slope

The ELWT slope is an indication of the trend of the chilled water temperature. It is calculated by taking readings of the temperature every few seconds and subtracting them from the previous value over a rolling one-minute interval.

Error

In the context of this manual, "Error" is the difference between the actual value of a variable and the target setting or setpoint.

Evaporator/Condenser Approach

The evaporator/condenser approach is calculated for each circuit. The equation is as follows:

Approach = LWT – Saturated Temperature

Evap Hold-loading

This is a setpoint that establishes the minimum evaporator pressure to which the chiller is allowed to go. It signals that the unit is at full load so the no further loading will occur that would lower the pressure even further.

Evap Recirc (Evaporation Recirculation) Timer

A timing function, with a 30-second default, that holds off any reading of chilled water for the duration of the timing setting. This delay allows the chilled water sensors to take a more accurate reading of the chilled water temperature.

EXV

Electronic expansion valve, used to control the flow of refrigerant to the evaporator, controlled by the circuit microprocessor.

Lenient Flow Logic

This option affords the chiller the maximum tolerance to intermittent water flow loss detection, and reduces nuisance chiller trips. Momentary loss of flow detection can be a result of valve changes in the primary loop, as when staging another chiller, or sudden changes in water temperature around the flow sensor. Variable speed pumps operating at minimum flow rates can exacerbate these flow issues.

Enabled, this logic detects a loss of flow signal (>5 Sec) in either the condenser or evaporator and sets an internal logic flag. Chiller operation is allowed to continue as long as the vessel pressures and surge detection remain valid. If condenser flow is lost and the pressure rises to within 5psi of the condenser pressure trip point the chiller will shut down on condenser flow loss alarm. If evaporator flow is lost and the evap pressure drops to the EP-Unload set point the chiller will shut down on evaporator flow loss alarm. If either flow signal is lost and the surge logic is tripped, the chiller will shut down and generate a flow loss alarm for whichever flow was missing.

The default setting for Lenient Flow logic in the WMC code is On. Turning it off converts the flow loss alarms, to timer based. Evap flow loss is adjustable from 12 down to 3s (default 12s),

and the condenser flow loss is adjustable from 20 to 3s (default 20s).

Load Balance

Load balance is a technique that equally distributes the total unit load between two or more running compressors.

Load Limit

An external signal from the keypad, the BAS, or a 4-20 ma signal that limits the compressor loading to a designated percent of full load. Used to limit unit power input.

Low Pressure Hold (Inhibit) Setpoint

The psi evaporator pressure setting at which the controller will not allow further compressor loading. “Hold” and “Inhibit” are used interchangeably.

Low Pressure Unload Setpoint

The psi evaporator pressure setting at which the controller will unload the compressor in an effort to maintain the minimum setting.

LRA

Locked rotor amps.

Minimum and Maximum Compressor Speeds

The (respective) Surge and Choke speeds, determined by the compressor software, are based on suction and discharge pressures.

Offset

Offset is the difference between the actual value of a variable (such as temperature or pressure) and the reading shown on the microprocessor as a result of the sensor signal.

OITS

Operator Interface Touch Screen, one screen per unit provides operating data visually and accommodates setpoint entry.

Part Load Balance Valves

These valves open before compressor start, to allow gas flow through the compressor, which stabilizes the impeller as it ramps up in speed.

pLAN

Pico Local Area Network is the proprietary name of the network connecting the control elements.

RapidRestore® Function

This logic has been introduced to reduce the time the chiller needs to recover from a power loss event. The chiller’s run status is continuously stored in battery backed RAM. When power is returned to the compressors it checks the status of this function, and if enabled it then checks if the chiller was running when power was lost. If so, it clears timers, enables the pumps, and clears power loss alarms. Evaporator water flow must be detected before the compressor is allowed to start, the re-circulation timer will be cleared. As the compressors start in quick session the maximum pull down rate is relaxed to promote a fast return to set point. The function ends when the ELWT has dropped below the Stage-Delta temperature, or a compressor shuts down (for any reason).

If other alarms are pending (such as a bearing fault) the RapidRestore® function will be canceled.

Refrigerant Saturated Temperature

Refrigerant saturated temperature is calculated from the pressure sensor readings. The pressure is fitted to an HFC-134a temperature/pressure curve to determine the saturated temperature.

RLA

Run load amps.

Soft Load

Soft Load is a control sub-routine that allows the chiller to load up gradually. It requires setpoint inputs of selecting it by Yes or No inputs by selecting the percent load to start ramping up and by selecting the time to ramp up to full load (up to 60 minutes).

SP

Setpoint

Stageup Delay

The time delay from the start of the first compressor to the start of the second.

Stageup/Stagedown Delta-T

Staging is the act of starting or stopping a compressor or fan when another is still operating. Startup and Stop is the act of starting the first compressor or fan and stopping the last compressor or fan. The Delta-T is the “dead band” on either side the setpoint in which no action is taken.

Startup Delta-T

Number of degrees above the LWT setpoint required to start the first compressor.

Stop Delta-T

Number of degrees below the LWT setpoint required for the last compressor to stop.

Suction Superheat

Suction superheat is calculated for each circuit using the following equation:

Suction Superheat = Suction Temperature – Evaporator Saturated Temperature

VDC

Volts, Direct Current; sometimes noted as vdc.

VFD

Variable Frequency Drive, a device located on the compressor used to vary the compressor speed.

Temperature / Pressure Chart

Table 26: HFC-134a Temperature / Pressure Chart

R-134a Temperature / Pressure Chart							
°F	PSIG	°F	PSIG	°F	PSIG	°F	PSIG
6	9.7	46	41.1	86	97.0	126	187.3
8	10.8	48	43.2	88	100.6	128	192.9
10	12.0	50	45.4	90	104.3	130	198.7
12	13.2	52	47.7	92	108.1	132	204.5
14	14.4	54	50.0	94	112.0	134	210.5
16	15.7	56	52.4	96	115.9	136	216.6
18	17.1	58	54.9	98	120.0	138	222.8
20	18.4	60	57.4	100	124.1	140	229.2
22	19.9	62	60.0	102	128.4	142	235.6
24	21.3	64	62.7	104	132.7	144	242.2
26	22.9	66	65.4	106	137.2	146	249.0
28	24.5	68	68.2	108	141.7	148	255.8
30	26.1	70	71.1	110	146.3	150	262.8
32	27.8	72	74.0	112	151.1	152	270.0
34	29.5	74	77.1	114	155.9	154	277.3
36	31.3	76	80.2	116	160.9	156	284.7
38	33.1	78	83.4	118	166.0	158	292.2
40	35.0	80	86.7	120	171.1	160	299.9
42	37.0	82	90.0	122	176.4	162	307.8
44	39.0	84	93.5	124	181.8	164	315.8

Daikin Applied Training and Development

Now that you have made an investment in modern, efficient McQuay International equipment, its care should be a high priority. For training information on all McQuay International HVAC products, please visit us at www.DaikinApplied.com and click on Training, or call 540-248-9646 and ask for the Training Department.

Warranty

All McQuay International equipment is sold pursuant to its standard terms and conditions of sale, including Limited Product Warranty. Consult your local McQuay International representative for warranty details. To find your local McQuay International representative, go to www.DaikinApplied.com.

Aftermarket Services

To find your local parts office, visit www.DaikinApplied.com or call 800-37PARTS (800-377-2787). To find your local service office, visit www.DaikinApplied.com or call 800-432-1342.

This document contains the most current product information as of this printing. For the most up-to-date product information, please go to www.DaikinApplied.com.

Products manufactured in an ISO Certified Facility.

©2014 Daikin Applied | (800) 432–1342 | www.DaikinApplied.com